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THE MALARIAS. RECENT STUDIES AND THEIR BEARINGS.

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Since the last general review on the malarias appeared in this *Bulletin* (Vol. 19, p. 93) death has claimed LAVERAN, who first detected malaria parasites in the blood of man and proved their association with malarial illness, and MANSON whose inductive brain led him inevitably from the phenomenon of exflagellation to the hypothesis of an insect host. In his "Memoirs" ROSS (1923) has also shown how the inspiration and aid of these men heartened him in the single-handed struggle, pushed to a conclusion in the teeth of necessary and unnecessary difficulties, as the outcome of which he, using indiscriminately *Proteosoma* or *Plasmodium* as occasion demanded, demonstrated the whole of the former's and part of the latter's life-history in *Culex* and *Anopheles* respectively, and, as was said when he received the Nobel Prize, "revealed the mysteries of malaria" to all who were cognizant of his plotted chart. In order to commemorate the twenty-fifth aniversary of this outstanding scientific demonstration it is intended to found in London a Ronald Ross Clinique for Tropical Diseases and Hygiene where laboratory research and clinical investigation shall be combined as far as possible.

WENYON (1923) has drawn attention to Richard PFEIFFER's deduction, made in 1892, that just as *Coccidium*, sporulating in an epithelial cell, destroys it and developes an oocyst for purposes of migration, so must *Plasmodium*, which sporulates in and destroys the erythrocyte, require an exogenous oocystic phase, completed possibly in certain insects, possibly in part at least in the soil, and conveyed to man through air, water, or, as KOCH suggested, through the sting of some bloodsucking insect.

Direct or Parasitic Diagnosis.

The same interval has produced much work on diagnosis, in which matter is bound up the question of latency.

Primary latencies or, as the matter is sometimes alternatively put, incubation periods, of six months and of one year are reported, these periods of residence in England having occurred before symptoms called attention for the first time to the infestation. In certain experimental infections made upon sufferers from general paralysis of the insane this latency has extended for tertian malaria to 31 days, quartan to 50 and subtertian to 14 days.

Secondary latencies are limited in duration, according to RIEUX (1922) to 12, lengthened later to 15 months. GARIN (1923) doubles this period. The experience of one or two individuals need afford no true indication of the length to which this period may extend.

To meet the cases in which, although infestation is present, it is manifested neither by clinical evidences nor by the detection of parasites in the peripheral blood when the usual thin smear is examined, the use of thick films and of provocative measures continues to be discussed. SEIDELIN (1922*a*) holds that thick films comprise the only means of reaching exactitude in an overworked laboratory. RIEUX, who will not admit the existence of malaria unless he find parasites in the peripheral blood (and presumably holds that he can detect parasites there in all cases in which infestation is present), and whose views on latency are, as noted, correspondingly influenced, prefers the continuous re-examination of thin films.

In the period under consideration no published work has elucidated whether provocative agents throw parasites into the peripheral blood by a mere redistribution, or by inducing vegetative reproduction. Di PACE (1922) as the result of eight years' work is satisfied that the most effective of such agents is the hypodermic injection of 2 to 3 mgm. of nitrate of strychnine. WHITMORE is investigating (1922) the value of violet light as a provocative in *Proteosoma* infection.

Indirect Diagnosis.

In estimating the value of the large mononuclear count in the diagnosis of malaria in the individual, LUCEY's work (1921) is important. The percentage of these leucocytes in finger blood, namely seven in a normal person, does not differ appreciably from that of venous blood; but, again in a normal person, the first drop of blood from the lobe or border of the ear may show a percentage as high as 35 to 41. If a film must be made from ear blood, the first two drops must be wasted.

For the diagnosis of malarial incidence in a community the value of the spleen rate has been rather widely considered. LEGER and BAURY (1922*a*) have found in Senegal no relationship between the parasite and spleen rates, in one village these being 35 and 4 and in another 3 and 27 respectively. The percentage of quartan malaria is very high in these regions.

In Dakar the same investigators (1922*b*) found a spleen rate of 14 and a parasite rate of 50, about half of those who had enlarged spleens not exhibiting parasites in the blood, a condition which they found also in French Guinea, while VAN LAAREN's figure (1922) was one fifth only.

In contrast to these equivocal papers is a group extracted in this *Bulletin*, Vol. 20, p. 551. At the 4th Congress of the Far Eastern Association of Tropical Medicine the value of the splenic index was not even discussed (1921). It was accepted as of unique value, one of the most precious assets of the malariologist; and a Committee of five was appointed to determine, not its quantitative value but the most accurate and usable means of employing it qualitatively, of measuring and recording rapidly and accurately the relative enlargement in each individual, so that the results could be correlated by the thousand.

Another instance of such refinement is that carried out by DARLING (1923) who arranged the school children of a Brazilian village according to the streets from which they came and found in those from the two rows of houses nearest the river a splenic index of 74, from the next 5 rows one of 26, from the next 4 one of 4, while beyond that it was 0.

The index pointed straight to the river bank, and there anopheline breeding-places were found and dealt with.

MAXCY and COOGLE (1923) tested the splenic index in the south-east Missouri lowlands, apparently its first application to the United States, in over two thousand, and the parasite rate in one thousand, school boys. Of those with parasites 50 per cent. had enlarged spleens, of those with enlarged spleens 20 per cent. showed parasites. They concluded that the local splenic index is not only large enough to be a practical factor in revealing the local malarial incidence, but forms a more accurate indication of the general occurrence of malaria than the parasite rate; while DARLING too questions whether the spleen rate may not be a more accurate measure of the big visceral happenings which accompany malaria than is the parasite rate—when the blood smear is examined by the usual technique.

It has been suggested that in the absence of syphilis, malaria may produce a positive Wassermann reaction. Perhaps the most significant recently reported case bearing on this point is one [MCCONNELL (1923)] in which this reaction was markedly positive, malaria present, and no clinical evidence of syphilis forthcoming. Necropsy revealed syphilitic aortitis.

There emerges from all this the conclusion, old but needing as much emphasis as ever it did. In any particular case the finding of parasites is the only justification for a positive diagnosis of present malarial infection; but the failure to find them by the ordinary techniques cannot justify a confident diagnosis that malaria is certainly absent.

The Life-histories of the Malaria Parasites.

(*a*) *The Asexual Cycle.*—Recent events render it advisable to hark back to John D. THOMSON's paper (1917) on certain aspects of malarial relapse. He pointed out that from the examination of a single case followed for 48 hours before relapse occurred, SCHAUDINN held that surviving female gametocytes multiply "parthenogenetically" and produce a brood of merozoits, these starting schizogony. Now parthenogenesis, or reproduction by unfertilized females, would in *Plasmodium* imply that in the mosquito's body an unfertilized female gamete produced a sporocyst. If an unfertilized female gametocyte produce in man's body a bunch of merozoits, this process, whatever it be, is not parthenogenesis, and no analogies can fairly be drawn between this and true parthenogenesis in other animals. The evidence tendered for SCHAUDINN's conclusion was simple. There were found in the same erythrocyte a female gametocyte and a number of spores, no obvious line of demarcation separating the former from the latter, and it was concluded that the spores had been thrown off by the gametocyte. THOMSON's paper then focussed attention on facts, not however observed for the first time, showing that within the same erythrocyte there may be found schizont and schizont, gametocyte and gametocyte, and schizont and gametocyte; and that in the last two cases the gametocytes may be of either sex. SCHAUDINN's induction implies that in the first two combinations, and in the third also, provided the gametocyte be a male, it is to be concluded that a double infection of the erythrocyte has occurred, just as when a ring accompanies another ring, or one of the other stages. Further, if the outline between a female gametocyte and a sporont be distinguishable they are apparently to be explained as a double infection. If the observer cannot distinguish this outline he must infer that the gametocyte has thrown off the spores.

This curious, devious and arbitrary conclusion has wider biological contacts.

It was acceptance of the principle, established by constant observation, that zoologically related genera have similar steps in their life-histories, which led PFEIFFER, as noted above, to deduce on the analogy of *Coccidium* a sporocystic stage for *Plasmodium*, and MANSON and ROSS to correlate in this respect *Halteridium*, *Proteosoma* and *Plasmodium*. Without assured reliance on this principle ROSS would not have switched to *Proteosoma* when *Plasmodium* material failed, and would not have solved the problem of the transmission of malaria. Since SCHAUDINN's parthenogenesis has not been reasonably suggested as occurring in any related protozoon, his theory is not only a curious and devious explanation of the appearances which he observed, but is not confirmed where its confirmation is rationally to be expected. Moreover, in the period under more immediate consideration KITAEFF and IOFF (1922) report the finding in the one erythrocyte of all combinations, and point out that SCHAUDINN's own plates show no morphological differences between the conditions which he ascribes to double infections and to "parthenogenesis," and that on SCHAUDINN's hypothesis their own observations imply "parthenogenesis" of microgametes.

The exiguous foundation on which these views of SCHAUDINN rest would scarcely justify the space occupied in displaying this point were it not for two recent occurrences.

PONTANO (1923) tenders experimental evidence which, he holds, demonstrates "parthenogenesis," in that injection of blood containing only crescents has induced malaria. The facts are contained in the accompanying Table. The argument runs thus :—

If a thick drop preparation of peripheral blood reveal no rings it is unreasonable to suggest that there are any in 8 to 10 cc. of that person's blood. Experiments 10 and 11 show that blood containing schizonts will produce malaria. Experiments 7 to 9 show that blood in which neither crescents nor rings are found will not carry infection. Experiments 1 to 4 show that if a malarial case whose blood contains crescents and rings be treated until the rings disappear, the blood will still convey malaria; while experiments 5 and 6 show that if treatment be carried further it will not do so. The first two series are, it is held, precisely similar in respect of the treatment given, and, taken with series 3, lead to the conclusion that the schizonts which caused malaria in the recipients can only have been derived from crescents.—

The first two series are, however, not identical. In all cases in which malaria appeared in the recipient treatment had continued for less than nine days after rings had ceased to be found in the films. In all cases in which malaria did not appear treatment had continued for nine days or more after this condition had been reached. This difference is essential. It cannot be disregarded, when one bears in mind the evidence (Vol. 19, p. 98) that treatment produces progressive fractional disinfestation. In other words, the longer the treatment the greater the destruction of parasites and the less likely are any to be present in the 10 cc. of blood injected. This consideration applies to all the cases cited, but with particular cogency to case 2, where one is asked to assume that while it required 74 days of energetic treatment so to reduce rings that they could not be found in a drop of blood, it needed but four more days to carry reduction to the extent that none was present in 10 cc. of blood.

		Duration of malaria in donor.	Duration in days of donor's treatment.	Quantity of quinine & cinchonine taken by donor.	Days of donor's freedom from rings.	Amount of donor's blood injected.	Incubation period in recipient in days.
				SERIES I.			
Blood of donor originally contained rings and crescents, and was treated until the rings but not the crescents had disappeared. It was then injected.							
1	..	2 years	16	34 gm.	(?)3, (?)4	8 cc.	40
2	..	4 years	74	188 gm.	4	(?)10 cc.	7
3	..	7 days	7	16 gm.	8	9 cc.	7
4	..	18 days	11	24½ gm.	8	10 cc.	7
5	..	23 days	16	44 gm.	(?)11 (?)12	5 cc.	No malaria induced.
6	..	27 days	27	71 gm.	(?)21 (?)23	10 cc.	No malaria induced.
				SERIES II.			
Blood of donor originally contained rings only and was not used until these had disappeared under treatment.							
7	..	1 year	16	32 gm.	13	8 cc.	No malaria induced.
8	..	1 year	13	21½ gm.	9	10 cc.	No malaria induced.
9	..	3 days	14	20 gm.	10	10 cc.	No malaria induced.
				SERIES III.			
Blood of donor, who was without treatment, contained rings only when injected.							
10	..	5 days	Nil	Nil	Nil	8 cc.	(?) 8, (?) 9
11	..	A few days.	Relapse after previous short treatment.	Nil	Nil	10 cc.	15

Note.—PONTANO's figures in table and text are not always identical.

Moreover, SINTON's cultivation experiments (1922*a*) directly prove that parasites may not be found in a thick film and may yet be present in less than 1 cc. of blood.

This experimental evidence of "parthenogenesis" is based then on the assumption that the blood used was free from rings. The assumption is clearly unjustified, the conclusions reached are accordingly untenable; and the evidence produced does not weaken the case against that unnatural suggestion. It remains to add (the second recent occurrence above noted) that the French Commission on Malaria holds definitely, without reasons given, that a certain number of gametes may regenerate by "parthenogenetic" division into schizonts.

The few who believe that there is one mutable species of malaria parasite, essentially of the subtertian form but changing to others with changing seasons, continue the frequent expression of their mutually destructive opinions. They disregard the possibility of double infections as a reasonable explanation of the phenomena on which their arguments rest. The following facts bearing on the matter have recently been published. DOERR and KIRSCHNER (1921) have during 13 consecutive months passed the same strain of *P. vivax* through 62 different persons, covering 240 parasitic generations. The parasite remained throughout *P. vivax*. MUEHLENS and KIRSCHBAUM (1921) during 15 consecutive months transferred *P. vivax* to 59 cases, 20 forming a continuous chain of descent, while quartan parasites were passed to 5 cases 3 in direct descent, and subtertian to 9 with a direct

chain of 4. In no case did tertian breed other than tertian, quartan than quartan, subtertian than subtertian. PAISSEAU and LOUBRIEU (1922) point out that autochthonous French cases of malaria should reasonably be single infections and that the only 3 such cases which they have been able to follow up remained as *P. falciparum* irrespective of season. LEGER and BAURY (1922*b*), commenting on a case of quartan malaria in a child of 20 days, note the unseemly haste which, on the unity theory, *Plasmodium falciparum* had here displayed in assuming its quartan disguise. NEVEU-LEMAIRE (1922), in view of the very definite morphological and biological characters of the three species of malaria parasites, finds, like so many others, the revival of the unity theory incomprehensible.

That both the unity and "parthenogenesis" theories run counter to the known anatomy and physiology of protozoa would in itself scarcely justify such full reference to them here, but they would, if true, have very definite practical bearings, clinical and hygienic, and the second has the backing of the French Commission; so that the space now devoted to their consideration seems justified as indicating the meagre foundations on which they stand, clarifying the position and minimizing the need for future references.

Within 100 miles of the place whence came the original specimens of *Plasmodium tenue* Stephens, SINTON (1922*b*) reports these forms in five cases. They appeared during six only of the 48 hours of the life-cycle of forms otherwise conforming morphologically to *P. falciparum*, and occurred particularly at the edges and ends of films. The infections were heavy but symptoms comparatively slight. SINTON points out the resemblance of these *tenue* forms to *P. immaculatum* Grassi and Feletti, 1907, but holds *P. tenue* to be a good species provided that a "tenue" stage be not a part of the life-history of *P. falciparum*. In other words he is unconvinced that the life-history of *P. falciparum*, as at present known in man, is complete. So, too, KNOWLES, ACTON and GUPTA (1923) have unsuccessfully searched by splenic puncture for possible unknown forms which might throw light upon the morphological mechanism of malarial relapse.

STEPHENS (1922) has designated as *P. ovale* forms, not always distinguishable from *P. vivax*, found in an East African case. Their resemblances are noted to *P. vivax minutum* Emin, 1914 (Syn. *P. camarense* Ziemann). It continues to be reported [CATANEI (1922); MARCHOUX (1922); LEGER and BEDIER (1922*a*)] that in certain cases, particularly if fatal, anomalous forms appear. DARLING (1921) gives reasons for believing that the creation of the subspecies *P. falciparum quotidianum* Craig, to account for forms of aestivo-autumnal fever having a quotidian periodicity, is unwarranted, CRAIG's (1921) charts showing evidence of a double tertian infection. BLACKLOCK and ADLER (1922) describe from the chimpanzee a natural malarial infection indistinguishable morphologically from *P. falciparum*. Transmission experiments between man and chimpanzee have hitherto been unsucessful. *P. bouilliezi* Leger 1922 [LEGER (1922)] from *Cercopithecus campbelli* is held to differ from *P. kochi*. BASS (1922) has failed to obtain cultures of *P. falciparum* in sera of *Macacus rhesus*, guinea-pigs and rabbits, indicating the inability of this parasite to infect these animals.

(*b*) *The sexual cycle.*—The suggestion that unknown forms possibly occur in the asexual cycle has been mentioned. Ingram JOHNSON (1922) postulates an unknown form in mosquitoes. Proceeding from

his observation that dengue immunizes against malaria he holds it unreasonable to believe that malaria parasites should be "digested" by *Culex* and survive in the closely related *Anopheles*, and suggests that an ultramicroscopic stage in *Culex* produces dengue. The inability of the same species of parasite to live in nearly related host genera is, however, a matter of frequent observation; and it was the observation that the life-history of the mosquito's gregarine was already complete in itself which convinced Ross (1923) that it represented no phase in the life-history of the malaria parasite, as he at one time thought it might.

The work of WALCH and WALCH-SORGDRAGER (1921) emphasized the fact, most important to the sanitarian, that the Anopheles which is the best local biological host is not necessarily that most concerned in carrying malaria in that particular locality. In this instance the optimum host was *A. ludlowi*, with an infection percentage of 17·5, the least effective biologically being *A. sinensis* with an infection percentage of only 1·5, yet since the latter outnumbered the former by 125 to 1, 107 specimens of *A. sinensis* were infected to every 10 of *A. ludlowi*, so that what one may term the pessimum known local host was the most hygienically important in the dissemination of the malarias. While considering this work it may be mentioned that, on analysis, it contains evidence supporting the findings of WENYON (1921) and of MAYNE (1920) that quinine is much more potent against the schizonts of subtertian and the gametocytes of tertian malaria than *vice versa*; while MUEHLENS and KIRSCHBAUM (*loc. cit.*) show the tolerance of the crescent to quinine in that in winter and in Europe they transmitted subtertian malaria through *A. maculipennis* to a fresh case, the donor, at the time when he infected the mosquito, being under the influence of quinine.

Regarding the life span of mosquitoes and of their parasitizing sporozoits MAYNE (1922) has shown that *A. punctipennis* may live for 231 days, and may harbour living sporozoits for at least 71 days after infection. The average life span of an infected, compared with a non-infected, mosquito was not tested, but since SCHUEFFNER and HYLKEMA (1922) found it comparatively easy to detect early infection in Anophelines, late infection being much rarer, it is reasonably concluded that infestation induced a considerable mortality among them.

So to arrange matters that the individual's own body is not at the moment the most attractive bait to the mosquito is a matter continuing to receive attention. SCHUEFFNER and HYLKEMA (*loc. cit.*) confirm very positively ROUBAUD's observation that certain Anopheles at least prefer animals to man, and that under conditions in which animal houses are so built as to offer to Anopheles the simple comforts of food, shelter and quiet which appeal to them, these houses serve to protect man from their bite and so proportionately from malaria. They estimate that a single buffalo can divert most of the *A. ludlowi* which would otherwise attack 100 persons, buffaloes being more attractive to these insects than are cattle. At the same time starving mosquitoes are broadminded, and will, as the brothers SERGENT note (1921), take enthusiastically to man-eating. Another aspect of this prophylactic self effacement lies in the need, again urged by STEPHENS (1921), of so placing European houses in malarial parts that they are not within easy mosquito flight of those who are infected and careless of their infection—that is to say of hygienically uneducated native inhabitants.

Economic Aspects.

Antagonism between food production and anti-larva measures, the same factors favouring production both of food and of larvae, has been illustrated. The fish ponds of Batavia support an industry of much commercial importance ; they also breed quantities of *A. ludlowi*, the essential malarial " vector " of coastal Java. The decision to retain them has resulted in the virtual removal of the town to Weltevreden, some miles inland. In another economic problem, that of rice fields, it is advised that in South Europe [KONSULOFF (1922)] these should be drained dry twice a month, thus twice subjecting to the direct rays of the sun each individual during the period required in these localities for its aquatic development.

Some Local Problems.

Of these the position in Corsica has excited the greatest interest, [SERGENT, Ed. and Et. and others (1921–22)] and seems to carry with it the most widely applicable general lessons. It is an affair of numerous intersecting vicious circles, comprising high freights for coal and manure, deforestation, drying of hill streams, starved and disappearing cattle, lessened cultivation, penury, malaria. The immense drainage works in the coastal plain are hygienically useless. The brothers SERGENT cite the parallel of Algeria, which, 80 to 90 years ago, was almost exactly as Corsica still is. Now it is a mosaic of intensive cultivation with malaria practically absent ; the value of intensive cultivation being held to lie mainly in the resulting prosperity, with its corresponding quality of food, clothing, housing and medication. Regarding Corsica, compulsory quininization is advised as the most promising first step in the essential immunizing process of getting rich. Sympathetic and state-aided administration the inhabitants must at first receive, for their vicious circles must primarily be broken for them by outside agency.

EUGLING's work in Albania (1921) demonstrated that adult Anopheles hibernate there within the straws of thatched roofs, as many as sixteen having been found in a single straw ; and that larvae in some way manage to survive in the laboratory for months under a layer of ice.

ANGUS's report (1919) on malaria in Palestine during war shows how, provided an antimalarial campaign be pushed with determination and vigour and supported by ample labour, a pestilential region may be occupied by an army without loss of military efficiency. It shows too the essential military value of MANSON-BAHR's Malaria Diagnosis Units.

Treatment.

Only one aspect of treatment is now dealt with, that of quinine administration in tablet form. Others are reserved for future consideration. Considerable heart-burning has followed the racy publication of M. BLANCHARD's experiments (1922) indicating that quinine tablets may be useless owing to their refusing to disintegrate and the consequent failure of the drug to be absorbed, as tested by its excretion in the urine. The French daily press having added with enthusiasm to the consternation so induced, SEIDELIN (1922*b*), LEGER and BEDIER (1922*b*), LANGERON (1922), SERGENT (Et.), FOLEY and CATANEL (1923) (a veritable malarial galaxy) have repeated the experiments with various types of tablet. In all cases quinine excretion, indicative of quinine absorption, was as good as or better than it was in controls

who took the drug in solution. A very grave responsibility rests on those who condemn this most convenient and popular form of quinine administration because one brand of tablets was of a fraudulent character.

Clinical Pathology.

Perhaps the most important observation in this matter is that of BENHAMOU, JAHIER and BERTHELEMY (1921), whose findings are that the urea content of the blood is an important prognostic element in pernicious malarial attacks. If it vary from 0·27 to 0·52 per cent. (or slightly more during fever) the prognosis is good even if there be coma and many parasites—provided quininization be sufficient. If it rise rapidly, or reach 2 per cent., prognosis, even with most energetic treatment by quinine, is grave.

. . . . .

Recent work points then to lines of investigation holding possibilities of fruitful advance; while local problems in plenty await solution by energetic and well directed application of principles already established.

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MEDICAL ZOOLOGY.

HEGNER (Robert W.). **The Prevalence of Intestinal Protozoa and Related Organisms in Porto Rico.** [Correspondence.]—*Jl. Amer. Med. Assoc.* 1921. Oct. 29. Vol. 77. pp. 1439–1440.

The author grasped an opportunity of examining the stools (one specimen; usually 2 hours, never more than 6 hours old) of 83 home-keeping natives of Porto Rico and found organisms in 75 of them, double and triple protozoon infections with admixtures of worms of various species being the rule. The following is the tale of protozoa: *Entamoeba coli* in 30, *E. histolytica* 10, *Endolimax nana* 6, *Iodamoeba bütschlii* 5, *Giardia intestinalis* 8, *Trichomonas hominis* 3, *Chilomastix mesnili* 3. Also *Blastocystis hominis* 36, and *Spirochaeta eugyrata* 1. He quotes figures from the Sanitary Commissioner's annual report showing for Porto Rico an average annual mortality of 24 per mille, 44·71 per cent. of which is infant mortality, of which, again, almost one-third is ascribed to diarrhoea and enteritis; and he considers that the situation in Porto Rico is very favourable for the study of the pathogenetic significance of the intestinal protozoa.

A. Alcock.

FANTHAM (H. B.). **Some Parasitic Protozoa found in South African Fishes and Amphibians.**—*South African Jl. Sci.* 1919. Jan.–Feb. Vol. 15. pp. 337-338.

——. **Some Parasitic Protozoa found in South Africa. II. III. IV. V.**—*Ibid.* 1919. Oct.-Dec. Vol. 16. pp. 185–191; 1920. Nov. Vol. 17. pp. 131–135; 1921. Dec. Vol. 18. Nos. 1 & 2. pp. 164–170; 1922. Dec. Vol. 19. pp. 332–339.

Explaining that the term "parasitic" is intended to cover commensalism and other equivocal or fortuitous animal associations, the author gives here the results of a preliminary survey of protozoon parasites in South Africa. The field of survey includes sea-fishes, mammals, birds, reptiles, amphibia, mollusca and insects, and the tracts investigated include various places besides the digestive tube and the blood. The record is interesting and valuable, but we can here touch only a few points pertinent to this *Bulletin*.

In the course of his work the author, who is one of the original exponents of the view that detects in the herpetomonads of insects the source of leishmaniasis, inoculated the peritoneum of a young white rat with the intestinal contents of a house-fly infected with *Herpetomonas muscae domesticae*, and afterwards examined the rat's blood *daily*—a detail which he insists upon as obligatory. On the 9th day "a few young developing herpetomonads" were found in the rat's blood; on the 25th day an "infection too slight to confirm" by staining, and on the 35th day "a crop of flagellates," which was final. The rat was alive and healthy 315 days after the inoculation. Considering that the animal was a young rat, and that no definite statement is given as to its having been rigidly protected from bad company before and after its inoculation, we are justified in reserving judgment on this rather crude experiment which the author appears to regard as proof of an infection in the rat by the Herpetomonas of the house-fly.

Repeated observations of Sarcocystis are recorded. Fixing attention on the spore phase, the author observed in sheep that in the cold season (June–early August) spores were few; that in spring they began to

increase in number, and that in summer (November–May) they became abundant—a seasonal prevalence, as he says.

Balantidium occurs in pigs in South Africa, and the author thinks that in certain circumstances it may be pathogenetic; for not only were red blood cells seen in individual ciliates, but also, on two occasions, minute ulcers were found in the caecum of pigs.

Among the numerous protozoa observed in the horse, a ciliate, *Cycloposthium bipalmatum*, is mentioned as being passed periodically, under conditions of diarrhoea and flatulence, by two horses that suffered from colic. One of these horses passed also a few amoebae very much like *E. histolytica* and ingesting red blood cells.

A. A.

JEPPS (Margaret W.). **Observations on Human Intestinal Protozoa in Malaya.**—*Parasitology.* 1923. June. Vol. 15. No. 2. pp. 213–220. With 1 plate & 14 text figs. [12 refs.]

A careful report on the protozoa discovered in the stools of 1,034 men, mostly Chinese and Tamil coolies, in the dysentery ward of the Kuala Lumpur hospital, nearly all of whom were or recently had been suffering from dysentery. In the majority of cases at least three microscope examinations were made. The following is the tale of species in their percentages: *Entamoeba histolytica*, 14·5; *E. coli*, 7·7; doubtful and degenerate amoebae, 2·5; *Endolimax nana*, 2·2; *Iodamoeba bütschlii*, 0·4; *Giardia intestinalis*, 4·2; *Trichomonas hominis*, 11·5; *Chilomastix mesnili*, 2·5; *Enteromonas hominis*, 3·5; *Embadomonas intestinalis*, 0·1. The rate of infection was for every species higher in Tamils than in Chinese.

A. A.

HAUGHWOUT (Frank G.). [In English and Spanish]. **Significance and Prevalence of Intestinal Animal Parasites in American and European Adults and Children in the Philippines.—Importancia y frecuencia de parasitos intestinales en los adultos y niños americanos y europeos en Filipinas.**—*Jl. Philippine Islands Med. Assoc.* 1923. Mar.–Apr. Vol. 3. No. 2. In English, pp. 72–78. In Spanish, pp. 105–108.

The author has participated in the examination of faeces of about 1,000 American and European adults and children in the Philippines, and has found intestinal parasites in 52 per cent. Among the *adults* 55·3 per cent. had them, *Entamoeba histolytica*, Ascaris, Trichuris, and hookworm being those specified. Among the *children* 28·4 per cent. were parasitized, two instances of *E. histolytica*, 15 of Ascaris, 16 of Trichuris, 8 of hookworm, and an undefined "frequency" of *E. coli* being those specified. Examinations of stools during the past three years show that the prevalent kind of dysentery in Manila is bacillary—in the proportion of 10 to 1.

A. A.

KNOWLES (R.), NAPIER (L. E.) & GUPTA (Biraj M. Das). **A Preliminary Note on the Relationship of the Intestinal Protozoa of Man to the Hydrogen Ion Concentration of their Environment.**—*Indian Med. Gaz.* 1923. Apr. Vol. 58. No. 4. pp. 151–155. [3 refs.]

ACTON has observed that in amoebic dysentery the stools are usually acid to litmus, and in bacillary dysentery alkaline, and that emetine

acts better in an alkaline than in an acid medium. Stirred by these facts, and by their own observation that in amoebic dysentery, when the stools are examined daily, a rising pH is usually concurrent with good progress of the patient, the authors undertook the present study of the pH of the "faecal environment" of the intestinal protozoa of man, apparently in the hope of gaining some practical knowledge of circumstances that may influence the activity and pathogeny of *Entamoeba histolytica*. They find that in pure amoebic dysentery, with the stools full of active entamoebae, the pH is usually about 6·22; that in the stage of recovery, when cysts are being passed, the pH is 7·17; and that later still, when Charcot-Leyden crystals hold the field, the pH is 7·36. And from these observations they infer that one of the factors causing *E. histolytica* to encyst may be an increased alkalinity of the pH environment, and also that a sudden alteration to an alkaline pH (as by saline aperients) may kill *E. histolytica* in the active motile stage. Their observations were made on stools examined as soon as they were received from hospital, and by a method of dialysis which they admit to be not quite free from possibility of error. The authors have also experimentally infected with *E. histolytica* a number of kittens, and have tabulated here the results, which show an acid pH of the fresh colon contents in the acute stage of the disease experimentally produced.

A. A.

HENRY (T. A.) & BROWN (H. C.). **The Influence of the Medium on the Toxicity of Certain Alkaloids towards Protozoa.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. Mar. 15 & May 17. Vol. 17. Nos. 1 & 2. pp. 61–71. [8 refs.]

Experiments described in this paper show that the toxic effect of both conessine and emetine on protozoa *in vitro*—as also, according to ACTON, of quinine—is considerably increased in an alkaline medium. Quinine base is therefore more toxic than quinine mono-hydrochloride (neutral), and both are more toxic than quinine di-hydrochloride (acid). The probable explanation of the phenomenon is that the alkali has a direct toxic effect on the organisms, though, as experiments here recorded show, this effect is not manifested until that of the alkaloid has been exercised.

In the study of the reactions of protozoa to alkaloids in media of different acid and alkaline concentration certain sources of error are indicated: (1) With infusoria the nature of the particular culture-infusion may affect the susceptibility of the animalcule; the animalcules of a given series of experiments must, therefore, either be grown in a medium of constant composition or be washed before use (which can be done without hurt by repeated slow centrifugation in tap water). (2) In dilutions, ordinary tap water neutralizes acid to a greater extent than distilled water, but tap water that has been boiled for 30 minutes and filtered largely loses this neutralizing power. (3) When alkali and alkaloid are added simultaneously to the protozoa in their medium, the toxic effect is much greater than when the alkaloid is added some time after the alkali, since in the latter case the dilute alkali absorbs CO_2 from the atmosphere and loses some of its alkalinity; this source of error can be obviated by rapidly mixing the culture of protozoa and the reagents together and sealing the mixture in a capillary tube.

As regards the application of their experiments to, say, the treatment of amoebic dysentery, the authors point out that alkalinity cannot be

imparted even to the faex simply by swallowing large doses of carbonate of soda, but that faeces are rendered alkaline to a slight extent by the oral ingestion of a combination of sodium carbonate with the heavy carbonate of magnesia and carbonate of bismuth.

A. A.

HEGNER (Robert W.). **The Effects of Changes in Diet on the Incidence, Distribution and Numbers of Certain Intestinal Protozoa of Rats.**—*Amer. Jl. Hyg.* Baltimore. 1923. Mar. Vol. 3. No. 2. pp. 180–200. With 1 plate & 1 text fig. [3 refs.]

Although the observations recorded in this paper are presented in a severe statistical form, which in the nature of the case must be taken to represent praiseworthy endeavour rather than final attainment of mathematical precision, they are extremely interesting.

Having determined the numerical incidence and the intestinal disposition of certain elements of the intestinal fauna of a large number of rats fed on a "normal" diet consisting mainly of vegetable produce, the author proceeded to investigate the effect upon those elements of the intestinal fauna of diets differing from the "normal."

The specific elements selected for detailed observation were (1) *Giardia muris*, which in 15 rats fed on normal diet was present in all, its optimum disposition being for the duodenum; (2) *Hexamitus muris*, which was present in 13 of the 15, its optimum but by no means exclusive disposition being for the ileum; and (3) *Trichomonas muris*, which was abundant in the caecum of all.

In one experiment 15 rats hitherto fed on normal diet were put on a carnivorous diet for 7 or 8 days. On subsequent examination it was found that although the bare fact of specific incidence was not much different, the *numerical* incidence of Giardia, and even more of Trichomonas, was greatly decreased, while that of Hexamitus was considerably increased. Moreover, the optimum disposition of Giardia was changed to the jejunum, while Hexamitus in most cases was restricted to the ileum exclusively.

As a sequel to this experiment, some rats (five) that had been kept on a carnivorous diet for a week were put on "normal" diet with a large addition of dextrin—a substance that is known to have a rapid effect on the intestinal flora. Evidence was obtained that on this diet a considerable lapse of time must occur for the intestine in its several sections to recover its normal density of protozoon population, and that Trichomonas did not multiply until the bacterial flora of the caecum had changed from the putrefactive to the acidophilous type.

In another experiment five rats were fed on a vegetable diet with addition of yeast; the result was that the average numerical incidence of Hexamitus and Trichomonas was greatly decreased, and that of Giardia was increased with a preponderance in the jejunum.

In another experiment some rats were fed—six for 24 days, two for 31 days—exclusively on whole milk. The results seem to have been extremely unfavourable to all three species of the intestinal protozoa: Hexamitus was found, and then in greatly reduced numbers, in four only; and Trichomonas, in even greater reduction, in six; while Giardia, considerably reduced, preponderated in the jejunum.

We agree with the author that these experiments are useful as a guide to further investigation of the influence of changes in diet upon intestinal protozoa, and—it may be added—as an incentive to even wider explorations from the same base.

A. A.

HOGUE (Mary Jane) & VAN WINKLE (Charlotte). **The Effect of Carbon Tetrachloride on Intestinal Protozoa.**—*Amer. Jl. Trop. Med.* Baltimore. 1923. May. Vol. 3. No. 3. pp. 197–202. [5 refs.]

Trichomonas, Embadomonas, and *Spirochaeta eurygyrata* treated with carbon tetrachloride died on the slide straightway, the first two soon disintegrating; but carbon tetrachloride in doses of 1 cc. to kittens infected with Giardia, and in doses of 3 cc. to human beings variously infected with Chilomastix, Trichomonas, Giardia, Iodamoeba, and *Endolimax nana*, had no premanent effect on any of those organisms.

A. A.

MARCHOUX (E.). **Action du stovarsol contre les lamblies.**—*Bull. Soc. Path. Exot.* 1923. May 9. Vol. 16. No. 5. pp. 325–326. [3 refs.]

A sickly girl of 11 years, who for several years had suffered periodically from diarrhoea that proved to be coincident with passage of Giardia cysts, was treated by the author, for six days, with a daily tabloid of 0·25 gm. of stovarsol (oxyaminophenylarsenic acid); seen 35 days afterwards, the child was better and was passing daily a single formed stool in which Giardia cysts could not by the most careful search be discovered. Another carrier of Giardia cysts was cleared in 10 days by two such quotidian tabloids. Other cases have not ended quite so happily; but the therapeutic value of this remedy in amoebic dysentery is being verified daily.

A. A.

PENTIMALLI (F.). **Flagellati del genere "Tricomonas" nel sangue circolante dell' uomo.**—*Ann. d'Igiene.* 1923. May. Vol. 33. No. 5. pp. 309–315. With 5 figs. [15 refs.]

In this interesting paper, besides a preliminary discussion of conflicting views as to the pathological significance of Trichomonas, there is to be found an account of a case in which a Trichomonas similar to *T. intestinalis* was found in the blood of a hospital patient suffering severely from chronic malaria. In a smear of blood drawn by means of a sterilized pipette and stained with Giemsa many of these flagellates were observed, and four of those that are figured have undoubtedly a close resemblance to ordinary Giemsa-stained specimens of *T. intestinalis*. They were observed on two occasions, at an interval of 10 hours. Some of the patient's blood was injected into the circulation of a rabbit, and some into the peritoneum of a guinea-pig—without any positive results. Owing to several adverse circumstances a satisfactory examination of the patient's faeces could not be made.

A. A.

SHORTT (H. E.). **The Pathogenicity of Insect Flagellates to Vertebrates, with Special Reference to** *Herpetomonas ctenocephali*, **Fantham.**—*Indian Jl. Med. Res.* 1923. Apr. Vol. 10. No. 4. pp. 908–933. With 1 plate. [32 refs.]

The history of this interesting subject is briefly reviewed, to begin with—on the one hand the results of the investigations of WENYON,

MACKIE, CHATTON, NÖLLER, and HOARE, who uniformly failed to infect vertebrate animals by injecting insect flagellates into them; on the other hand the uniformly successful operations in this field of LAVERAN and FRANCHINI, FANTHAM and PORTER, and FRANCHINI and MANTOVANI.

The successful operations are then criticized. Attention is directed to the following particulars that require explanation: that although so many animals died after being inoculated with insect flagellates, the individual post mortem investigations did not reveal that large number of parasites which common experience of fatal protozoon infections leads one to expect; that uninucleate forms were so frequently found in the infections attributed to flagellates; that the large number of successful infections (85 per cent. in the cases reported by FANTHAM and PORTER), and so many of them fatal, in animals that largely live on insects, implies a susceptibility remarkably strange in itself and also remarkably difficult to check by "control" observation; that culture methods of distinguishing the specific flagellates were so little used; and that in one of the FRANCHINI and MANTOVANI successful experiments Anaplasma forms resulted from an injection of herpetomonads and when passed on gave rise again to herpetomonads.

A multitude of facts that may give occasion to fallacious inferences in experiments of this kind are then recounted. Flagellates may continue to live, perhaps for several days, and even in adverse circumstances, after removal from their proper insect hosts. Thus HOARE found bug flagellates that had been injected into a vertebrate alive there after four days, and kept ked crithidia alive in normal saline for seven days, and the author kept Herpetomonas taken from a flea alive for six days in a pocket of a Euphorbia. Then many vertebrates are infested with herpetomonads of their own. Artifacts, again, such as distorted platelets and nuclei, may simulate parasites in stained films. Furthermore, in dissecting small animals like mice it is not impossible to damage the gut and so to permit any protozoa that it may contain to escape into fluids and organs from which films are made. Above all, perhaps, the author in the course of his own experiments has observed mice to be infected, not seldom, with a fungus parasite, named by him *Cryptococcus muris*, which may perhaps be the clue to the frequent uninucleate forms of FRANCHINI and FANTHAM.

Finally, the author tabulates with extreme care the results of fifty-four of his own experiments in this field. The insect flagellates that he used were *Herpetomonas ctenocephali* and *H. luciliae*, and the vertebrates into which he introduced them, either in food or by intraperitoneal or intravenous or subdermal or other way of injection, included monkeys, dogs, rabbits, rats, mice, pigeons, and frogs. In no instance did any infection of a vertebrate result. Of the few animals (mainly mice) that died or were killed *in extremis* after being injected, seven were found to be infected with *Cryptococcus muris*.

A. A.

WENYON (C. M.). **Coccidiosis of Cats and Dogs and the Status of the *Isospora* of Man.**—*Ann. Trop. Med. & Parasit.* 1923. July 12. Vol. 17. No. 2. pp. 231–288. With 6 plates & 2 figs. [121 refs.]

This valuable paper contains not only beautifully illustrated descriptions of the Coccidia occurring in cats and dogs, but also a historical

review of the literature of the subject and a copious bibliography—so that it is really a monograph and of much wider importance than its title implies. Of particular value is the series of 61 very finely executed figures representing the schizogony, the development of the gametocytes, and the sporogony of *Isospora felis* in great detail. Incidentally the author's studies have led him to the conclusion that the two forms of Isospora oocysts found in human faeces, which have been assumed to be different sized forms of one species, really represent two distinct species: for the smaller of these forms the name *Isospora hominis* is retained, since the author has no doubt of the historic validity of the appellation; while for the larger form the new name *Isospora belli* is proposed.

A. A.

MAZZA (Salvador). [**Frecuencia del** *Blastocystis hominis* **en las deposiciones de diarreicos cronicos y su tratamiento apropiado.**]—*Prensa Med. Argentina.* Buenos Aires. 1922. Nov. 10. [Summarized in *Bull. Inst. Pasteur.* 1923. July 15. Vol. 21. No. 13. pp. 523–524.]

In the examination of 200 stools from cases of dysentery and chronic diarrhoea the author found *Blastocystis hominis* alone in 50 per cent. and Blastocystis associated with one or more of the following organisms: *Entamoeba histolytica, Giardia intestinalis, Trichomonas intestinalis, Chilomastix mesnili,* Spirillum, — in 40 per cent. more. Thus Blastocystis was absent in only 10 per cent. This fact, coupled with the decrease or recrudescence of the organism according as the patient grew better or worse, convinces the author of the pathogenetic activity of Blastocystis. Blastocystis diarrhoea is characterized by frequent passage of soft or liquid, greenish coloured, acid, and very offensive stools, sometimes concurrent with abdominal pain referred to the region of the caecum or the colon. It is the persistence of Blastocystis unaffected by emetine that explains the relapses in chronic dysentery. The best treatment for Blastocystis diarrhoea is by novarsenobenzol continued for some time: it should be given in capsules or coated tablets of 0·10 gm., 3 or 4 times a day.

A. A.

YAKIMOFF (W. L.). **Sur la question des** *Blastocystis.*—*Bull. Soc. Path. Exot.* 1923. May 9. Vol. 16. No. 5. pp. 326–330. [21 refs.]

Opinions on the nature and significance of Blastocystis are here reviewed, from 1849 to 1917. In 1919 and 1920 the author had to do with "cholero-dysenteric epidemics" in which Blastocystis occurred in the stools, often in association with cholera vibrios, dysentery bacilli, and a variety of protozoa, but much more often by itself alone. In 30 per cent. of 253 cases of Blastocystis *solummodo* the stools were formed, in 33.9 per cent. they were watery, and in the remainder they were variously sanguinolent, or glairy, or rice-water like, or in some way abnormal. The author, therefore, thinks it possible that Blastocystis is not so innocuous as is commonly assumed.

A. A.

i. FRANCHINI (G.). **Essais d'inoculation de latex parasités aux souris blanches. Abcès du foie expérimentaux déterminés par les amibes des latex.**—*Bull. Soc. Path. Exot.* 1923. Mar. 14. Vol. 16. No. 3. pp. 162–166. With 1 text fig.

ii. ——. **Action des latex végétaux sur différents protozoaires. Culture de trypanosomes dans les latex (2e Note).**—*Ibid.* Apr. 11. Vol. 16. No. 4. pp. 256–263.

iii. LAVERAN (A.) & FRANCHINI (G.). **Expériences sur les flagellés de la punaise du chou.**—*Ibid.* May 9. Vol. 16. No. 5. pp. 319–323. With 2 text figs.

i. An amoebic infection, often slight but sometimes mortal, can be produced in mice by inoculating them with milky juice of Euphorbias (and certain other plants) containing parasites, or with cultures of such plant parasites, or with cultures of tissues of mice that have been infected with such plant parasites. In the case of two mice so infected the author has ultimately observed an abscess of the liver, in the pus of which, or in the neighbouring liver tissue, or in the intestine, amoeba-like parasites with ingested red blood cells in their cytoplasm were not rare. Twenty individual parasites are crudely figured. The blood of the liver in these two cases, when cultivated in Nöller's medium, gave good cultures of the parasites. [The author's terminology lacks uniformity of precision, and it is not always quite clear that the term "parasites" always refers to the latex-amoebae specified in the title.]

ii. The experiments here recorded show [as H. E. SHORTT has already shown in the case of *Herpetomonas ctenocephali*] that trypanosomes of vertebrates can live for some time in the latex of plants—longer than in normal and citrated saline; as also can Lamblia, amoebae, and other intestinal parasites, including bacteria. It is very probable, the author thinks, that certain kinds of sap, even much diluted, may be fit to replace bouillon and other media for culture of bacteria.

iii. A Herpetomonas and a Crithidia are to be found, sometimes in great numbers, in the intestine of a bug—*Pentatoma ornatum*—infesting cabbages in parts of Italy and southern France. These flagellates, injected into the peritoneum of young white mice, can give rise to very slight infections. On one occasion cultivation in N.N.N. medium of heart blood of one such infected mouse produced round or oval organisms, but these did not develop into flagellates nor could they be subcultured.

A. A.

i. SWEZY (Olive). **Mitosis in the Encysted Stages of** *Endamoeba coli* **(Loesch).**—*Univ. California Public. Zool.* 1922. May 20. Vol. 20. No. 13. pp. 313–332. With 3 plates. [16 refs.]

ii. FEIBEL (Bruno). **Die** *Iodamoeba bütschlii* **beim Schweine und die Bedeutung dieser Infektion des Schweines für den Befall des Menschen mit diesem Parasiten.**—*Inaug. Diss. Doct. Med. Vet. Berlin.* Hamburg. 1922. 17 pp. [Summarized in *Bull. Inst. Pasteur.* 1923. June 15. Vol. 21. No. 11. pp. 430–431.]

iii. BACH (F. W.). **Zur Kenntnis der bei Affen vorkommenden Entamöben.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1923. Feb. Vol. 27. No. 1. pp. 31–37. With 14 figs. [5 refs.]

i. *Entamoeba coli* in mitosis is said to possess six chromosomes in distinction from *Councilmania lafleuri*, which has eight.

ii. In 32·8 per cent. of the pigs at the abattoir in Hamburg, most, but not all, of them from 9 to 12 months old, the author found either active forms or cysts of *Iodamoeba bütschlii*. The author remarks on the specific identity of Iodamoeba, Balantidium, Ascarids, and paratyphoid bacillus in man and pig.

iii. A minutely critical account with figures of an amoeba, from a long-domesticated *Macacus rhesus*, finally adjudged to be the *Entamoeba duboscqi* found by MATHIS in a monkey of the same genus. [See this *Bulletin*, Vol. 3. p. 80.]

A. A.

i. LINS (Abdon Eloy Estellita). **Protozoarios e protozooses.**—*Arch. Brasileiros de Med.* 1923. Apr. Vol. 13. No. 4. pp. 381–409. With 4 text figs. [3 refs.]

ii. AMSTER. **Ein neues Züchtungsverfahren für Protozoen.**—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Oct. 24. Vol. 89. No. 1/3. pp. 166–168.

iii. TALIAFERRO (W. H.). **A Study of Size and Variability, throughout the Course of "Pure Line" Infections, with** *Trypanosoma lewisi*.—Reprinted from *Jl. Experim. Zool.* 1923. Feb. Vol. 37. No. 2. pp. 127–168. With 10 text figs. [19 refs.]

iv. LYNCH (Kenneth M.). *Tricercomonas intestinalis* **and** *Enteromonas caviae* **n. sp. and their Growth in Culture.**—*Jl. Parasit.* 1922. Sept. Vol. 9. No. 1. pp. 29–32. With 9 text figs.

v. ZOTTA (G.). **A propos de l'action favorisante du sang sur le développement du** *Leptomonas pyrrhocoris* **dans le bouillon glucosé.**—*C.R. Soc. Biol.* 1923. Apr. 14. Vol. 88. No. 12. pp. 913–915. [4 refs.]

vi. DESCHIENS (R.). **Variations tinctoriales et morphologiques de** *Giardia intestinalis*.—*Bull. Soc. Path. Exot.* 1923. May 9. Vol. 16. No. 5. pp. 323–325. With 1 text fig.

vii. INAMI (Hamisuke). [**On a New Species of Leukocytozoon found Parasitic in the Cell Nucleus of the Host and on its Development.**]—*Saikingaku Zasshi* (*Jl. of Bact.*). 1922. Dec. No. 327. [Summarized in *Japan Med. World.* Tokyo. 1923. Apr. 15. Vol. 3. No. 4. pp. 85–86.]

viii. LEGER (L.) & HESSE (E.). **Coccidies d'oiseaux palustres. Le genre** *Jarrina* **n.g.**—*C.R. Acad. Sci.* 1922. Jan. 3. Vol. 174. No. 1. pp. 74–77. With 9 text figs.

ix. LEGER (André). **Corps de Graham-Smith dans les hématies d'un Primate** (*Macacus rhesus*).—*Bull. Soc. Path. Exot.* 1922. Oct. 11. Vol. 15. No. 8. pp. 679–680. [1 ref.]

x. MCDONALD (J. Daley). **On** *Balantidium coli* (**Malmsten**) **and** *Balantidium suis* (**sp. nov.**), **with an Account of their Neuro-Motor Apparatus.**—*Univ. California Public. Zool.* 1922. May 8. Vol. 20. No. 10. pp. 243–300. With 2 plates & 15 text figs. [50 refs.]

i. This appears to be the first instalment of a handbook for the study of pathogenetic protozoa in the laboratory.

ii. Discusses peptone solution as a good medium for cultivation of protozoa.

iii. A highly technical biometric paper.

iv. On a n.sp. of Enteromonas from faex of guinea-pig; discusses synonymy of *Tricercomonas intestinalis*.

v. Description of a series of experiments in the cultivation of *Leptomonas pyrrhocoris* in glucose bouillon of pH=7·6 diluted with sheep-blood. In all dilutions from 1 in 5 up to 1 in 5000 sheep-blood promotes the multiplication of the flagellates, but the optima are those between 1 in 50 and 1 in 200. The concurrent influence of H-ion concentration is to be the subject of future consideration.

vi. Certain cysts of Giardia and even certain small active forms, when treated with iodine, take on, instead of the traditional colour, a sky-blue tinge. These blue cysts are observed often to be fractured, and then they generally show bluish-green. The author thinks that these abnormally staining forms, which are concurrent with normally staining forms, are indicative of active multiplication in the small intestine.

vii. A new Leucocytozoon, exhibiting active division in viscera, from *Zosterops japonica.*

viii. *Jarrina* n.g. (so called from oval jar-shaped oocysts) from coot and moorhen.

ix. Describes *Grahamella rhesi* from *M. rhesus*, not visible in unstained blood and not affecting health of host.

x. Besides detailed descriptions and statistical comparisons of the two species the paper includes a list of all the known species of Balantidium and their respective hosts, which latter include Polyps, Medusae, Turbellaria, Annelida, Crustacea, Mollusca, frogs, newts, tortoise, fish, cavy, pig, and man.

A. A.

COWDRY (E. V.). **The Distribution of Rickettsia in the Tissues of Insects and Arachnids.**—*Jl. Experim. Med.* 1923. Apr. 1. Vol. 37. No. 4. pp. 431–456. With 3 plates. [21 refs.]

The author reports that he has examined specimens of 111 species of Arthropods, including spiders, ticks, mites and other arachnids, centipedes, and 13 orders of insects, and has found intracellular, Gram-negative, bacterium-like Rickettsia in 19 of these species, namely, in a spider, 10 species of ticks, 2 species of Trombidiidae, the silver fish-insect (Lepisma), the bed-bug, a chrysopid, 2 species of fleas, and an Ichneumon-fly. He allows that some of the forms included in his definition of Rickettsia ("bacterium-like organisms which are intracellular and Gram-negative") may be bacteria [as his figures strongly and frequently suggest], but he does not agree that they are cognate with Chlamydozoa; and although he admits the resemblance in shape between granules of blood-derived pigment and certain Rickettsia of insects, he is not inclined to accept the all-sufficiency of WOODCOCK's explanation of the source of Rickettsia.

A. A.

BUXTON (P. A.). **On Predicting the Seasonal Prevalence of an Insect.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. Feb. 15. Vol. 16. No. 8. pp. 465–468. With 1 fig. [3 refs.]

The author emphasizes the argument, which is not quite so novel as he seems to think, that it is the *concurrence* of the optimum conditions of temperature and moisture in any given locality that advances a particular species there. But since we cannot foresee local atmospheric temperatures and moistures, having at most only meteorological records of the past as an uncertain guide, the recognition of this proposition—as the author undoubtedly realizes—does not imply that the seasonal prevalence of an insect can be predicted with any sort of confidence.

A. A.

ROOT (Francis Metcalf). **Preferential Feeding Experiments with Anopheline Mosquitoes.**—*Amer. Jl. Hyg.* Baltimore. 1923. May. Vol. 3. No. 3. pp. 354–355.

Preliminary experiments on the preferences of *Anopheles quadrimaculatus* were conducted in August and September. In each test

several hundred specially bred females were liberated at about 6 p.m. in a mosquito-proof shed divided into six stalls occupied by men and domestic animals. Next morning the mosquitoes that had fed were searched for and collected, and the blood in the stomach identified by the precipitin test. In every experiment where men (in bed with only head and arms exposed) were tested in competition with horses or cows, some mosquitoes fed on men although two or three times as many fed on the domestic animals; considering the greater extent of surface exposed by the animals it is doubtful whether the result indicates any decided preference of *A. quadrimaculatus* for animal blood. In repeated experiments with horses and cows alone, a certain cow was twice as attractive as a horse, while another cow was only half as attractive as the same horse. For more definite conclusions as to preferences of Anopheles mosquitoes, experiments on a larger scale are necessary.

A. A.

i. GRASSI (B.). **Nuovo contributo allo studio dell' anofelismo (paludismo) senza malaria.**—*Rend. R. Accad. Naz. Lincei.* Rome. Classe Sci. fisiche, matemat. e naturali. 1922. Nov. 5. Vol. 31. No. 9. pp. 419–423.

ii. ——. **I cibi preferiti dagli Anofeli.**—*Ibid.* Dec. 3. No. 11. pp. 496–500.

iii. ——. **Ancora sulle preferenze degli anofeli: consequenze epidemiologiche.**—*Ibid.* Dec. 17. No. 12. pp. 535–543.

i. In certain parts of Tuscany where malaria had gradually become extinct, there occurred, probably as a result of infection introduced by returned soldiers, a recrudescence of the benign tertian form of the disease. But, although among the soldiers who reintroduced the infection the disease remained resistant to quinine and relapses were frequent, the local cases were cured with surprising ease—by a few centigrammes of quinine or even by simple purgation. Grassi's explanation is that in malaria-free localities malaria parasites in their passage through Anopheles may undergo attenuation, and he would explain this attenuation by assuming some altered condition in the water in which the Anopheles are bred—possibly a lessened salinity.

[In the light of certain observations made in 1917–18 by S. P. JAMES (this *Bulletin*, Vol. 14, p. 71), one is inclined to question the assumption that this recrudescence of malaria in Tuscany is to be attributed to returned soldiers. JAMES states that "true indigenous malaria in England," as observed by him particularly in the estuary of the Medway, is a mild disease, sometimes so mild as not to interrupt the sufferers' ordinary routine, and rarely relapsing. On the other hand he observed that civilians in a certain part of the same area who became infected through returned soldiers at a military camp, "undoubtedly with the Salonika parasite," were seriously ill and suffered many relapses].

ii. & iii. Grassi disagrees with the view that Anopheles have fixed predilections for any particular species of animal; he thinks that their tastes vary in different localities, and that this variation in food may be one of the factors that influence the epidemiology of malaria. He does not believe in the theory of protection by cattle against malaria; in that part of Padua where malaria is rife the number of cattle is no

less than in Verona and other parts of Italy, where malaria is hardly known or quite unknown. Grassi thinks that the waters of Padua contain more salts than those of Verona, and assumes this to be another instance of the virulence of Anopheles being aggravated by the salinity of the water in which they were bred.

A. A.

CRAGG (F. W.). **The Zoophilism of Anopheles in Relation to the Epidemiology of Malaria in India : A Suggestion.**—*Indian Jl. Med. Res.* 1923. Apr. Vol. 10. No. 4. pp. 962–964. [1 ref.]

Accepting ROUBAUD's views upon the efficacy of cattle in affording protection from malaria, the author considers their bearing upon the epidemic malaria that in India has been observed to follow heavy rainfall immediately following periods of deficient rainfall and famine. It has been estimated that in the bad famines of last century more than half the cattle were lost, and the author's suggestion is that this loss of protective cattle must be a very important factor in the causation of an epidemic of malaria subsequent to a famine.

A. A.

LEGENDRE (J.) & LOUIS (J.). **Anophélisme et Paludisme à Beyrouth.**—*Bull. Soc. Path. Exot.* 1923. Feb. 14. Vol. 16. No. 2. pp. 86–89. [1 ref.]

Without reason, the town of Beirut was supposed to be malarious. During the winter the authors made unremitting search for Anopheles, but could not anywhere find either hibernating adults or hibernating larvae. At the end of March six larvae of *A. bifurcatus* were found in a well, and in the following October, in some pools in the bed of the river, a few larvae of *A. superpictus*. Following this last find, two cases of primary malaria occurred in the garrison. The authors think that the malaria of Beirut must have been Phlebotomus fever.

A. A.

COOLING (L. E.). **Mosquito-Larvivorous Fishes in Relation to Mosquito Reduction Work in Australia.**—*Health.* Melbourne. 1923. Apr. Vol. 1. No. 4. pp. 94–98. [1 ref.]

The crimson-spotted sunfish (*Melanotaenia nigrans*), the green perchlet (*Priopis olivacea*), and the firetail (*Carassiops galii*), are specified as very useful fishes for keeping domestic water-vessels clear of mosquito larvae, since they live happily in captivity. But fish that may devour mosquito larvae in an aquarium need not necessarily be equally destructive under natural conditions, where, among other environmental differences, they have a choice of prey.

Sewage pollution, which in itself is far from unfavourable to larvae of *Culex quinquefasciatus* (= *fatigans*), facilitates the breeding of this species by its fatal effect on its fish-enemies, for although the carp-gudgeon (*Carassiops compressa*) and the trout-gudgeon (*C. mogurnda* var. *adspersa*) can stand a good deal of sewage they do not seem to be much carnivorous.

A. A.

i. CHRISTOPHERS (S. R.). **The Structure and Development of the Female Genital Organs and Hypopygium of the Mosquito.**—*Indian Jl. Med. Res.* 1923. Jan. Vol. 10. No. 3. pp. 698–720. With 2 plates & 3 text figs. [13 refs.]

ii. BALFOUR (Andrew). **Mites on Mosquitoes.**—*Jl. Roy. Army Med. Corps.* 1923. Feb. Vol. 40. No. 2. pp. 122–127. [15 refs.]

iii. LEON (N.). **Ueber die Speichelpumpe der Culiciden.**—*Cent. f. Bakt.* 1. Abt. Orig. 1923. June 28. Vol. 90. No. 5. pp. 361–362. With 1 fig. [4 refs.]

iv. NEVEU-LEMAIRE (M.). **L'évolution de la classification des** *Culicidae.*—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. Apr. Vol. 1. No. 1. pp. 90–107. With 4 text figs. [29 refs.]

v. WILSON (C. E.). **Report of the Entomologist.**—*Rept. Virgin Islands Agric. Expt. Sta., St. Croix, 1921.* Washington, D.C. 1922. Oct. pp. 12–24. [Summarized in *Rev. Applied Entom.* Ser. B. 1923. May. Vol. 11. Part 5. p. 80.]

vi. EDWARDS (F. W.). **Mosquitoes reared by Dr. W. E. Haworth from Coconut Palms in East Africa.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. Feb. 15. Vol. 16. No. 8. pp. 498–501. With 1 text fig. [1 ref.]

vii. CABALLERO (A.). **Otras especies larvicidas del genero** *Chara.*—*Bol. R. Soc. Espan. Hist. Nat.* Madrid. 1922. Nov. Vol. 22. No. 9. pp. 418–421. [Summarized in *Rev. Applied Entom.* Ser. B. 1923. May. Vol. 11. Part 5. p. 76.]

viii. MACFIE (J. W. S.). **A Note on the Action of Lithium Chloride on Mosquito Larvae.**—*Ann. Trop. Med. & Parasit.* 1923. Apr. 18. Vol. 17. No. 1. pp. 9–11.

ix. CONNOR (M. E.) & MONROE (W. M.). [**Notes sur la durée de la vie des larves d'***Aëdes calopus* (*Stegomyia*) **privées de l'oxygène de l'air et vivant dans de l'eau alcaline.**]—8 pp. 1922. Mexico: Edited by Departamento de Salubridad Publica. [Summarized in *Bull. Office Internat. d'Hyg. Publique.* 1923. Apr. Vol. 15. No. 4. p. 505.]

x. MACFIE (J. W. S.). **Depth, and the Larvae and Pupae of** *Stegomyia fasciata,* **F.**—*Ann. Trop. Med. & Parasit.* 1923. Apr. 18. Vol. 17. No. 1. pp. 5–8. [1 ref.]

xi. CONNOR (M. E.). [**Renseignements sur l'***Aëdes calopus* (*Stegomyia*).]—8 pp. 1922. Mexico: Edited by Departamento de Salubridad Publica. [Summarized in *Bull. Office Internat. d'Hyg. Publique.* 1923. Apr. Vol. 15. No. 4. p. 506.]

i. A very clear description, with some excellent figures.

ii. A useful summary, with references to original publications on the subject.

iii. Remarks on the absence of a salivary pump in Corethra, and on its larger size in the female (especially old females) than in the male of Culicines and Anophelines.

iv. A historical review of the subject, leading up to the author's own ingenious classification into five subfamilies: Anopheline, Sabethine, Megarhine, Uranotaeniine and Culicine—the Corethrines being excluded as a separate family.

v. The mosquitoes of St. Croix are *Culex fatigans, Stegomyia fasciata,* and *Anopheles albimanus.*

vi. A list of 17 species of mosquitoes breeding "in considerable numbers" in water collecting in the tops of coconut palms: it includes *Anopheles costalis* and *pretoriensis, Stegomyia fasciata,* and *Culex fatigans.*

vii. Besides *Chara foetida, C. gracilis* and *C. intermedia* are toxic for mosquito larvae. Even the water in which these plants have been grown may be toxic.

viii. Lithium chloride even in very weak solutions is very hurtful to larvae of *Stegomyia fasciata, Culex fatigans, Anopheles costalis,* and even of *Mansonia africana.*

ix. Petroleum being directly toxic to larvae, inspectors at Tampico were instructed to inform the population that it was not necessary to leave it in their washing-water longer than ten minutes.

x. It has been thought that larvae of *Stegomyia fasciata* are incommoded by depths of more than three feet: this paper records evidence that the pressure of even seven feet of water has no injurious effect upon them.

xi. A summary of existing knowledge of the subject.

A. A.

i. DE BUEN (Sadi). **Algunas observaciones sobre la biología del** *Anopheles claviger* **F. en Talayuela (Cáceres).**—Reprinted from *Bol. de la Real Soc. Española de Historia Natural.* 1922. June. Vol. 22. pp. 284–294.

ii. LARDE Y ARTHES (Carlos Roberto). **Anofeles de el Salvador y profilaxia palúdica.**—*An. del Depart. Nac. Hig.* Buenos Aires. 1922. Jan. & Feb.; May & June; Sept., Oct., Nov., & Dec. Vol. 28. Nos. 1, 3, & 5 & 6. pp. 17–35; 179–195. With 8 figs., & 321–340. With 3 figs.

iii. BARNES (M. E.). **Notes on the Anopheline Mosquitoes of Siam.**—*Amer. Jl. Hyg.* Baltimore. 1923. Mar. Vol. 3. No. 2. pp. 121–126.

iv. MARTINI (E.). **Die Stechmücken und die Trockenheit des letzten Jahres (1921).**—*Zeitschr, angew. Ent.* Berlin. 1923. Jan. Vol. 9. No. 1. pp. 121–132. With 2 figs. [Summarized in *Rev. Applied Entom.* Ser. B. 1923. May. Vol. 11. Part 5. pp. 73–74.]

v. MACFIE (J. W. S.). **A Note on a Beetle which preys on Mosquito Larvae.**—*Bull. Entom. Res.* 1923. Apr. Vol. 13. Pt. 4. p. 403.

vi. CHRISTOPHERS (S. R.). **An Anopheles of the** *Myzorhynchus* **Group (***Anopheles amazonicus* **sp. n.) from South America.**—*Ann. Trop. Med. & Parasit.* 1923. Apr. 18. Vol. 17. No. 1. pp. 71–78. With 1 plate. [1 ref.]

vii. EVANS (A. M.). **Notes on Culicidae in Venezuela, with Descriptions of New Species. Part III.**—*Ibid.* pp. 101–111. With 5 text figs. [6 refs.]

viii. CHRISTOPHERS (S. R.). **A New East-African Anopheline (***A. kingi***) related to** *A. natalensis*, **Hill and Haydon, and** *A. watsonii*, **Leicester.**—*Indian Jl. Med. Res.* 1923. Apr. Vol. 10. No. 4. pp. 1008–1019. With 2 plates. [5 refs.]

ix. NEIVA (Arthur) & PINTO (Cesar). **Sobre uma nova anophelina brazileira (***Cellia cuyabensis* **nov. sp.).**—*Brazil Medico.* 1923. Apr. 28 Year 37. Vol. 1. No. 17. pp. 235–236. With 3 text figs.

i. This is one of a series of papers on the biology of *Anopheles maculipennis*, which is being studied locally in the province of Cáceres as part of an antimalarial campaign. It describes in much detail observations on the hibernation of the insect.

ii. A useful compilation. The four local spp., *tarsimaculatus*, *pseudopunctipennis*, *strigimaculatus* and *apicimaculatus* are described in detail in all their phases.

iii. Eighteen species mentioned, all well-known Oriental forms.

iv. An interesting item of this discursive article is the statement that eggs of *Anopheles bifurcatus* kept on damp (not wet) earth for six weeks in an air temperature of 19°–22° C. can hatch afterwards.

v. The beetle is *Cicindela octoguttata*, a tiger beetle said to be a common tropical African species. These beetles are often seen in rows at the edge of pools and puddles, standing alert just in the water. The author has watched them for hours preying on larvae of *Anopheles costalis*.

vi. One very remarkable feature of this species is the length of the anterior fork-cell, which is one-third that of the wing.

vii. The "new species," *Anopheles venezuelae* [this *Bulletin*, Vol. 19, p. 828], is here formally consigned to Lethe as a synonym of *A. punctimacula* of DYAR & KNAB.

viii. *Anopheles kingi* is a large Myzorhynchus-like insect with *sinensis*-like wings, easily identified by having all four segments of the palpi tipped with white, the femora and tibiae conspicuously spotted and by the hind tarsi being entirely dark as to the last segment and creamy white as to the fourth and the distal portion of the third segments.

ix. Nearly related to "*Cellia*" *rondoni* of these authors.

A. A.

JOHNSON (W. B.) & LLOYD (Llewellyn). **First Report of the Tsetse-Fly Investigation in the Northern Provinces of Nigeria.**—*Bull. Entom. Res.* 1923. Apr. Vol. 13. Pt. 4. pp. 373–396. With 5 plates & 1 map. [4 refs.]

In the Northern Provinces of Nigeria the prevalent tsetse-flies—to which this report is restricted—are *G. palpalis*, *G. tachinoides*, and *G. morsitans*. The local distribution, breeding habits, hosts and host-relations, susceptibility to trypanosome infection, and general economic and pathonomic importance of these three species are here seen to have been most carefully and skilfully analysed and compared.

G. palpalis is dependent on forest that is mainly evergreen; for *G. tachinoides* a combination of evergreen and deciduous trees is sufficient; but tangled, impenetrable forest is interdictive to both species. *G. morsitans* requires a certain amount of shade, and is restricted to "game" tracts; but *palpalis* and *tachinoides* get a considerable part of their nourishment from animals (probably crocodile and Varanus) other than mammals, and *tachinoides* can thrive where man is almost the only host.

Of the three species, as here investigated, *G. tachinoides* is the most dangerous, as well as the most hurtful economically; since, being a carrier of human trypanosomiasis in the north-eastern and eastern districts and being also a carrier of the trypanosomiasis of domestic animals, it comes more in touch both with men and cattle than its two congeners. It, therefore, more than any other of the locally-prevalent species, hinders that increase of population and that expansion of farming which are the most certain checks upon the tsetse-fly.

For this and other good reasons, the breeding habits of *G. tachinoides* are described in some detail. The typical breeding-places are patches of sand in openings of the forest, or dry beds of streams, shaded by high trees but not by low bushes—a distinction from *G. palpalis*. The rate of breeding is restrained in the wet season, perhaps because in the dense, luxuriant undergrowth, food at that season is hard to find and nutrition suffers. There is no striking disproportion in the sexes in collections of *tachinoides* caught by the net.

We have here noticed merely the more pertinent conclusions of a right piece of work—a clear, concise, well-digested report of a comprehensive, perspicacious, well-conducted survey—which should be consulted in the original, both for its matter and for its scientific method.

A. A.

CARPENTER (G. D. Hale). **Report on a Test of a Method of attacking *Glossina* by Artificial Breeding Places.**—*Bull. Entom. Res.* 1923. Apr. Vol. 13. Pt. 4. pp. 443–445.

The author, throwing all his manifold local and general experience into the business, constructed decoy breeding-places for *Glossina palpalis* in two islands of Lake Victoria that were well known to him

[see this *Bulletin*, Vol. 16, p. 107]. Though the decoy breeding-shelters turned out to be much more popular with the flies than neighbouring natural breeding-places selected for comparison, the author reluctantly concludes that his hopes of destroying tsetse-flies by this single measure have not been justified ; at the end of nearly a year there is no appreciable lessening in the number of pupae deposited. He still thinks, however, that in combination with other measures this procedure would be useful in reducing the numbers of the fly.

A. A.

i. EDWARDS (F. W.). **New and Old Observations on Ceratopogonine Midges attacking other Insects.**—*Ann. Trop. Med. & Parasit.* 1923. Apr. 18. Vol. 17. No. 1. pp. 19–29. With 1 text fig. [19 refs.]

ii. O'GORMAN (C. J.). **Sand-Flies.**—*Jl. Roy. Army Med. Corps.* 1923. July. Vol. 41. No. 1. pp. 47–48.

iii. LARROUSSE (F.). **Nouvelle espèce Américaine du genre** *Phlebotomus P. Tejeraae,* **et tableau permettant de déterminer les males des différentes espèces de ce genre.**—*Bull. Soc. Zool. de France.* 1922. Vol. 47. pp. 41–46. [1 ref.]

iv. NEVEU-LEMAIRE. **Les phlébotomes en pathologie humaine.**—*Rev. prat. Malad. des Pays Chauds.* Paris. 1922. Oct. Vol. 1. No. 1. pp. 25–33. With 1 text fig.

v. ATKINS (W. R. G.). **Note on the Chemotropism of the House Fly.**—*Ann. Applied Biol.* 1921. Nov. Vol. 8. No. 3–4. pp. 216–217.

vi. FERRIS (G. F.). **Observations on the Larvae of some Diptera Pupipara, with Description of a New Species of Hippoboscidae.**—*Parasitology.* 1923. Mar. 22. Vol. 15. No. 1. pp. 54–58. With 4 text figs.

i. Annexed to these interesting observations is a list of references to original papers.

ii. The author states that as a result of two years' study of the habits of "Sandflies" at Peshawar he is persuaded that they do not pass through a 16-mesh mosquito net.

iii. A key to the males of the species of Phlebotomus.

iv. This is an instructional paper briefly describing Phlebotomus (with a good figure of *P. papatasii*), and the diseases which it is instrumental in transmitting.

v. This confirms the efficacy of dilute formalin and of beer as fly-traps. The attractive effect of aeroplane "dope" and even more of nitro-cellulose varnish upon flies is also noticed.

vi. An interesting paper in which are described the larvae of a Streblid (*Aspidoptera megastigma*), of *Nycteribia pedicularia*, and *Ornithomyia strigilecula*.

A. A.

TICHO (A.). **Ophthalmomyiasis.**—*Brit. Jl. Ophthalm.* 1923. Apr. Vol. 7. No. 4. pp. 177–182. [7 refs.]

Six cases of "external" ophthalmomyiasis (*i.e.*, myiasis of the coverings and adjuncts of the eyeball), have been observed by the author in ten years ; in all, the patient's account was that something had struck the eye and caused pain, the result generally was conjunctivitis and swelling of the eyelids, and the diagnosis was made by observation of the living maggots. Brief abstracts of most of the cases are given ; in three of them the larva or larvae were identified, and were, severally, "Oestrus-like," *Oestrus ovis*, and *Rhinoestrus purpureus*.

A. A.

WRIGHT (R. E.). **A Further Note on Myiasis of the Frontal Sinus.**—*Indian Med. Gaz.* 1923. June. Vol. 58. No. 6. pp. 259–260. With 1 fig.

Case of a child of one year admitted to the Madras Ophthalmic Hospital with a suppurating sinus over the left eyebrow. On the left side the forehead and nose were extensively inflamed, the eyelids swollen and closed, and the skin all round the orbit was excoriated, the eyeball, however, was unaffected. The sinus showed a punched-out edge and led into a bony cavity in which live maggots were seen, these being identified as *Chrysomyia bezziana*. The maggots were removed by irrigation, the sinus was drained, and the child was discharged, apparently well, ten days afterwards. A. A.

i. GROS (J.) & MORENO (R.). [**Tres casos de miasis nasal.**]—*Bol. Med. Quirurgico.* Habana. 1922. May. Vol. 2. No. 5. p. 3. [Summarized in *Arch. f. Schiffs-u. Trop.-Hyg.* 1923. Feb. Vol. 27. No. 1. p. 39.]

ii. PEDRO (Antonio). **Novo tratamento das myases.**—*Brazil-Medico.* 1923. Apr. 7. Year 37. Vol. 1. No. 14. p. 190.

iii. FLETCHER (T. B.). **Report of the Imperial Entomologist.**—*Sci. Repts. Agric. Res. Inst. Pusa. 1921–1922.* pp. 51–67. With 3 plates. Calcutta. 1922. [Summarized in *Rev. Applied Entom.* Ser. B. 1923. Mar. Vol. 11. Pt. 3. p. 35.]

iv. PERYASSU (A.). [**Os Mosquitos Portadores de Ovos da Mosca do "Berne." (Nota Previa).** [Mosquito Transporters of the Eggs of *Dermatobia hominis*. Preliminary Note.]—*A Folha Medica.* Rio de Janeiro. 1922. July 15. Vol. 3. No. 14. p. 105. With 1 text fig. [Summarized in *Rev. Applied Entom.* Ser. B. 1922. Nov. Vol. 10. Pt. 11. p. 217.]

i. The maggots in these cases are stated to be *Lucilia hominivorax*, a very common species in Cuba.

ii. The frequency and the serious consequences of myiasis due to the screw-worm fly (*Cochliomyia macellaria*) are mentioned. For maggots in the nasal fossae the author very strongly recommends ethyl chloride by insufflation or irrigation or in pomade.

iii. Several cases of myiasis due to *Chrysomyia bezziana* were reported during the year.

iv. Eggs of *Dermatobia hominis* found on abdomen of a mosquito (*Psorophora posticata*) in Brazil. A. A.

BODET. **Notes sur quelques cas de pseudo-myase rampante ou oerbiss, ou pseudo-draconculose observés à Tamatave.**—*Ann. de Med. et de Pharm. Colon.* Paris. 1920. (Numéro exceptionnel.) pp. 50–56. [1 ref.]

The lesion, simulating creeping myiasis and guineaworm, here discussed is a sinuous, rapidly progressive, cord-like swelling of the epidermis, occurring usually on the dorsum of the foot near the toes; there is little or no inflammatory reaction, but intense itching, particularly at night. When the lesion is opened up throughout its course, all that is found is a clear or opalescent fluid, with perhaps some leucocytes and epidermal debris. Of the nine cases here described, three were in little children and six in recruits over 18 years of age; some of the latter spoke of it as "Ver senegalais"; the Malagasy name for it is "Parasy-kankana" (= flea-worm). In two children's cases the eruption was in the neighbourhood of the anus. In one of the adult cases the swelling somewhat resembled the track of a guineaworm. In all cases the incisions made by free opening healed under a simple dressing. Although no parasite was detected in the track, or in the

fluid, or on the dressings, the lesion looks like the work of a parasite. Is it a nematode, or the maggot of some fly, or an acarine, or a flea? The author suggests that it may be a female chigger behaving strangely as a result of not having been fertilized.

A. A.

DA MATTA (Alfredo). **Dermatophylose.**—*Amazonas Med.* Manaos. 1922. Year 4. Vol. 4. Nos. 13–16. pp. 126–129. With 1 plate.

The accompanying illustration of a case of extensive infestation by chiggers (*Dermatophilus*, or as, according to JORDAN & ROTHSCHILD, it should now be known, *Tunga penetrans*), from the Lower Amazons, sufficiently describes this paper.

A. A.

Profuse infestation with chiggers—*Tunga* (= *Dermatophilus*) *penetrans*.
[Reproduced from the *Amazonas Medico*.]

CRAGG (F. W.) & SWAMINATH (C. S.). **Some Observations on the Bionomics of *Xenopsylla astia*, Rothsch.**—*Indian Jl. Med. Res.* 1923. Apr. Vol. 10. No. 4. pp. 979–989. [3 refs.]

These observations were made in Agra in the early part of the hot weather of 1921.

As it is not possible to distinguish between living specimens of *X. astia* and *X. cheopis*, much trouble had to be taken with the identification of the former species after death. In order to obtain eggs of *X. astia* the fleas had to be kept under the nearest possible approach to natural conditions, and even then many of the eggs obtained proved unfertile. The earliest day of hatching of the egg was the fourth, the latest the eighth, the duration of larval life was 6–12 days, and the time spent in the cocoon was 7–14 days—under the temperature and humidity conditions of the experiments. Under ordinary laboratory conditions starved fleas seldom survived more than 24 hours, but at lower temperatures and higher humidity they stuck out for at least a week. *X. astia* was observed to feed on man, but with some hesitation. Many individuals escaped in the laboratory, but the authors did not find a single one taking refuge on them personally, and were not ever aware of being bitten. A. A.

FERGUSON (Eustace W.). **The Distribution of Rat Fleas in Australia.** [Correspondence.]—*Med. Jl. Australia.* 1923. June 9. 10th Year. Vol. 1. No. 23. pp. 653–654.

This is a criticism of a report on common species of Australian fleas that appeared in "Health," of Feb., 1923, p. 52. In that report it is stated that 48 per cent. of 136 fleas collected from rats in Sydney were *Pulex irritans*, whereas the author's long and extensive experience in Sydney is that the percentage of *P. irritans* found on rats in Sydney is 0·1. A. A.

i. CRAGG (F. W.). **Further Records of the Distribution of the Indian Rat Fleas, with a Note on the Correlation between the Prevalence of *Xenopsylla cheopis* and Plague Mortality.**—*Indian Jl. Med. Res.* 1923. Apr. Vol. 10. No. 4. pp. 953–961. [1 ref.]

ii. DELANOË (P.). **De la répulsion exercée par le mouton sur les puces.**—*Bull. Soc. Path. Exot.* 1923. Feb. 14. Vol. 16. No. 2. pp. 96–97. [1 ref.]

i. The author's provisional theory that the prevalence of plague is in direct relation with the prevalence of *Xenopsylla cheopis* and that the default of plague, in an epidemic form at least, is in direct relation with the prevalence of *Xenopsylla astia*, has already been considered in this *Bulletin* (Vol. 19, p. 490). The present paper contains further statistics consonant with the theory.

ii. The author has observed [this *Bulletin*, Vol. 19, p. 842] that the sheep's fleece is fatal to fleas, and his further observations, here reported at length, show that fleas actually flee the presence of sheep. A. A.

i. HOFFMANN (W. H.). **Ueber *Triatoma flavida*, eine kubanische Reduviide.**—*Muench. Med. Woch.* 1923. May 11. Vol. 70. No. 19. p. 603.

ii GRÚSZ (Frederick). **Note on the Secretions of the Digestive Glands in *Phthirus pubis* L. and their Biological Functions.**—*Parasitology.* 1923. June. Vol. 15. No. 2. pp. 203–204. [5 refs.]

i. The Cuban species formerly described by this author [this *Bulletin*, Vol. 20, p. 421] as *Rhodnius prolixus* turns out to be not that species at all, which is restricted to South America, but *Triatoma flavida*.

ii. To separate the secretion of the salivary glands of the crab-louse from that of the glands in the insect's midgut the author detaches the head and thorax from the abdomen of a number of lice and makes separate extracts from these two parts. The extracts obtained from crushed head-and-thorax of crab-lice are anticoagulant and haemolytic; 0–2 cc. of extract was sufficient to hinder the coagulation of 1 cc. of fresh blood and "in a smaller measure" to dissolve the red blood corpuscles. The extracts obtained from crushed abdomen of crab-lice are coagulant and anti-haemolytic.

We must demur to the arbitrary alteration by the author of the old familiar name of Phthirius, which is a correctly transliterated version of a correctly formed generic derivate from Phtheir, to *Phthirus*; also to the arbitrary concoction of a masculine plural "abdomines" from a neuter singular "abdomen."

A. A.

DUNN (Lawrence H.). **The Ticks of Panama, their Hosts, and the Diseases they Transmit.**—*Amer. Jl. Trop. Med.* Baltimore. 1923. Mar. Vol. 3. No. 2. pp. 91–104. [8 refs.]

Twenty species of ticks occur in Panama, five of them being species of very wide distribution over the world. Those dangerous or vexatious to man are *Ornithodorus talaje, Amblyomma cajannense* and *A. ovale. O. talaje* is so persistent to man as to be known as the human tick, its habits being those of the bed-bug; its young stages are commonly spent on the black and the brown rat; it has lately been shown up as transmitting relapsing fever in Panama. The two species of Amblyomma are notorious pests to travellers in the bush during the dry season; they are very abundant and attack man and animals indiscriminately.

A. A.

CURTIS (W. L.) & CURTIS (Martha E.). **Otiobiosis, the Ear Tick Disease.** —*Jl. Amer Med. Assoc.* 1923. Apr. 14. Vol. 80. No. 15. pp. 1053–1055. With 2 text figs. [8 refs.]

Otiobiosis stands for invasion of the auditory meatus by *Ornithodorus* (*Otiobius*) *megninii*. In describing a case the authors remind us that this tick (the ear-tick) is found in Mexico and several of the Western States of America, and has been carried on stock to South Africa. It enters the meatus as a tiny larva, gorges itself there in 5–12 days, and becomes transformed into a spiny nymph which remains in the ear-passage for several weeks. When full grown, the nymph drops out of the ear and crawls to a hiding-place in a wall or a fence, where it becomes adult, not feeding although, if sexuality be not consummated, it may live for more than a year. The trespass of the larva and nymph in the human ear may give little trouble, or sometimes may cause excruciating pain and give rise to local inflammation. Reports of previous cases in man are here recorded.

A. A.

i. CILENTO (R. W.). **Random Observations on Mite Infestations of Man.**—*Med. Jl. Australia.* 1923. May 19. 10th Year. Vol. 1. No. 20. pp. 552–554. [5 refs.]

ii. FERGUSON (Eustace W.). **Mite Infestation of Man in Australia.** [Correspondence.]—*Ibid.* June 9. 10th Year. Vol. 1. No. 23. p. 653.

i. In searching the Australian literature of infestation of man by mites as a preliminary to the study of the epidemic glandular fever of

Queensland and the general question of mite-borne disease, two cases of infestation by the tropical fowl-mite, *Liponyssus bursa*, have come to the author's notice. [The species of Liponyssus, formerly known as Leiognathus, are usually parasitic on small mammals; they resemble the bird-mites (Dermanyssus) from which, however, they differ in having the chelicerae in both sexes chelate.]

ii. The author in noticing the above paper draws attention to two cases of infestation of human beings in Australia by the rat-parasite, *Liponyssus* (*Leiognathus*) *bacoti*; also to infestations by another species of Liponyssus not exactly identified; also to an outbreak of dermatitis caused by *Pediculoides ventricosus* introduced in dried butter-milk.

A. A.

WALCH (E.). **On *Trombicula deliensis*, probably Carrier of the Pseudotyphus and on other Trombicula Species of Deli.**—*Kitasato Arch. Experim. Med.* Tokio. 1923. Feb. Vol. 5. No. 3. pp. 63–83. With 2 plates. [12 refs.]

This deals with the seven species of Trombicula at present known to exist in Sumatra. The larvae of three of them are known to attack man, and one of these three, *T. deliensis*, which also attacks rats, is not only very much like the larva of the Japanese *T. akamushi*, but also is believed to be the carrier of a pseudotyphus thought to be a variety of Japanese river fever. A useful bibliography is appended.

A. A.

i. LARROUSSE (F.). **Présence au Kef (Tunisie) d'une nouvelle espèce du genre** *Ornithodoros*: *O. Normandi* **n. sp.**—*Ann. Parasit. Humaine et Comparée.* Paris. 1923. June. Vol. 1. No. 2. pp. 170–177. With 4 text figs.

ii. ARAGÃO (Henrique de Beaurepaire). *Ornithodoros brasiliensis* **n. sp.**—*Brazil-Medico.* 1923. Jan. 13. Year 37. Vol. 1. No. 2. p. 20. With 1 text fig. [2 refs.]

iii. MAJOCCHI (Domenico). **Di un' epidemia di acariasi da grano.**—*Giorn. di Med. Milit.* 1922. July 1. Vol. 70. No. 7. pp. 301–303.

i. *Ornithodorus normandi*, a species recently discovered in the burrows of rodents, in Tunis, is remarkable for its small size; the adult female, which is much larger than the male, is only 3–8 to 4–2 mm. long and 2–4 to 2–8 mm. broad.

ii. A new species from South Brazil, very much resembling *O. brasiliensis*.

iii. Another instance of "epidemic" acariaris due to *Pediculoides ventricosus* infesting, in this case, straw mattresses.

A. A.

MILLS (Ralph G.). **Observations on a Series of Cases of Dermatitis caused by a Liparid Moth,** *Euproctis flava* **Bremer.**—*China Med. Jl.* 1923. May. Vol. 37. No. 5. pp. 351–371. With 9 text figs. [23 refs.]

This paper contains a very full account of an intensely irritant papulous dermatitis, resembling nettle-rash, caused by the hairs of *Euproctis flava*, a common species of the family of tussock-moths (Lymantridae or Liparidae) in the Far East. The moth, which is of a yellow colour, is otherwise not unlike a silkworm moth; the suspected hairs are hollow and more or less barbed. The dermatitis is not always

simple; it is sometimes associated with nausea, vomiting, and diarrhoea, and this, together with the fact that the hairs are hollow, has suggested the existence of a toxin. No toxin, however, has been discovered, and experiment up to the present indicates that the action of the hairs is mechanical. A long bibliographical index is appended.

A. A.

DA MATTA (Alfredo). **Dermatose vesico-urticante produsida por larvas de lepidopteros.**—*Amazonas Med.* Manaos. 1922. Year 4. Vol. 4. Nos. 13–16. pp. 167–170.

Descriptions of a case of vesiculous urticaria caused by the hairy caterpillar of a moth of the Family *Megalopygidae* (Flannel moths) and of the irritant barbed hairs.

A. A.

BAERG (W. J.). **The Effects of the Bite of** *Latrodectus mactans* **Fabr.**—*Jl. Parasit.* 1923. Mar. Vol. 9. No. 3. pp. 161–169. With 1 chart. [1 ref.]

The author, having made some experiments with rats, which convinced him that the bite of *Lathrodectes mactans*, though followed by symptoms very different from those following the bite of an Agelena spider, were not terribly serious to the rats, allowed a *Lathrodectes mactans* to bite his finger, and he here describes the results, which were unpleasant enough notwithstanding that he went to hospital and was treated.

The bite caused sharp pain, which presently became duller, and some swelling and local perspiration. In 20 minutes the arm began to ache and the aching gradually extended to the shoulder, then to the chest, and then to the legs. About four hours after the event his speech and breathing were spasmodic, and he went to bed, sweating profusely and tremorous. The pain in the legs kept him restless all night, and although he was relieved by treatment he suffered various pains and aches through the next day; moreover, a "strip of pimples" appeared, extending from the bitten finger to the elbow. In the second night he got some broken nightmare sleep. In the third morning he suffered from headache, and spasms of aching of the bitten hand, but in the afternoon he was better, though troubled with a tendency to faint on getting up. In the afternoon of the fourth day he went to office and tried to work, but "felt wretched." The fifth day he felt quite well, but there was still pain in the left hand, and the next day this gave way to itching, which lasted several days. The temperature, which had risen after he was bitten, continued fluctuating for about a month.

A. A.

PUBLIC HEALTH REPORTS. 1923. June 22. Vol. 38. No. 25. pp. 1405–1406.—**Fish Poisoning on the U.S.S. "Florida" during 1922,** [1 ref.]

Two outbreaks of fish poisoning among the ward-room officers and servants of the U.S.S. "Florida," in the vicinity of the Virgin Islands, are here recorded. In the first (March, 1922) the fish eaten are known locally as "carang," and by the ship's company as "skipjack." They were caught in the afternoon, salted, put into the refrigerator, and eaten at luncheon the next day; their smell and taste were beyond

criticism. The first symptoms—vertigo, nausea and diarrhoea, common to all cases—were noticed three or four hours afterwards; subnormal temperature and retarded pulse were general symptoms. Most of the patients complained of pains in muscles and joints and itching of the skin, and in some cases the joint pains lasted for two or three weeks. In the second epidemic (July) the fish eaten were a barracuda and a carang, caught in the afternoon, salted, put in the refrigerator, and eaten at noon next day, their delectable flavour being a matter of comment. The results, both in form and time, were as above delivered, but the symptoms were more severe. Was the poisoning caused by a toxin or by some subtle inodorous putrefactive change? It is a significant point that the carang caught near Culebra, Porto Rico, and eaten in the U.S.S. "Delaware" did not cause any toxic effects.

A. A.

CAWSTON (F. G.). **Some Molluscan Inhabitants of the Natal Lagoons.**—*South African Jl. of Science.* 1922. Dec. Vol. 19. pp. 277–279.

The author specifies at least seven freshwater mollusca, all hospitable to larval forms of flukes, that may commonly be found in brackish water lagoons in Natal. He states that neither the cercariae issuing from these mollusca nor the mollusca themselves can survive for any length of time in the brackish water [but ANNANDALE in his extensive survey of the fauna of the Chilka Lake, on the Orissa coast of the Bay of Bengal, has observed there numerous freshwater animals living in salt water, and numerous marine forms—even such typically marine animals as sea-anemones and medusae—living in salt water, and has even seen there marine and fresh-water sponges growing together on the same rock]. The seven species observed by the author are *Modiola capensis*, infested with dicrocercal cercariae; *Tiara tuberculata*, heavily infested with cercariae resembling *C. cawstoni*; *Physopsis africana*, the common local intermediary of *Schistosoma haematobium* and *mansoni*; *Limnaea natalensis*, an intermediate host of *Cercaria pigmentosa* and larval forms of Fasciola; *Isidora tropica* and *I. forskali*, sometimes infested with Amphistomes; and *Planorbis pfeifferi*, commonly infested with cystophorous and other cercariae.

A. A.

CLELAND (J. Burton). **The Parasites of Australian Birds.**—Reprinted from *Trans. Roy. Soc. S. Australia.* 1922. Vol. 46. pp. 85–118. [5 refs.]

This, which represents an enormous amount of work, is a classified list of Australian birds in which parasites have been found, the parasites also being classified, though by no means always specifically identified. With the additional hosts and parasites discovered by the author, the number of species of Australian birds now known to harbour parasites is, according to the general nature of the parasitism, as follows: Cestodes in 95 species, Trematodes in 38, Nematodes in 36, Microfilariae in 34, Acanthocephala in 27, fleas on 2, Hippoboscidae on 4, Mallophaga on 118, ticks on 4, mites on 39, Haemosporidia in 47, Haemoflagellates in 12.

A. A.

UNDULANT FEVER.

YAKIMOFF (L.). **La fièvre ondulante au Turkestan russe.**—*Bull. Soc. Path. Exot.* 1923. Apr. 11. Vol. 16. No. 4. p. 227.

In 1911, two cases of undulant fever were observed by A. A. KRAMNIK, at Askhabad; one in a Persian woman, the second in a Russian who had been in Persia; both were infected by goats' milk, proved by agglutination methods. By the Mission studying malaria in Turkestan, in 1913, agglutination tests were carried out with a strain of *M. melitensis* obtained from NICOLLE, Tunis, on the serum of six goats, one of which proved to be positive. The author thinks that undulant fever also exists in Persia and that probably Persian goats are infected. He states that 90 per cent. of the domestic animals in the district of which Askhabad is the capital, are of Persian origin; Russian Turkestan and Persia, therefore, may be considered as endemic centres of undulant fever.

P. W. Bassett-Smith.

BALFOUR (Andrew). **Undulant Fever in the Anglo-Egyptian Sudan.** [Correspondence.]—*Jl. Trop. Med. & Hyg.* 1923. Mar. 15. Vol. 26. No. 6. p. 102.

While the writer was at Khartoum a case of undulant fever in a resident post office employee came under his notice, so that the case reported by ARCHIBALD [see this *Bulletin*, Vol. 20, p. 378] is not the first on record for that area. The occurrence of probable cases in the Kassala district was reported by BOUSFIELD, in 1908.

P. W. B-S.

BURNET (Et.). **Rapports du** *Micrococcus melitensis* **et du** *B. abortus* **de Bang.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1923. Vol. 3. No. 1. pp. 48–66. [7 refs.]

Investigations with many strains of *M. melitensis* and *B. abortus* convinced the author that the two are really one species. In the guinea-pig he was unable to differentiate them by any known method, though *abortus* was as a rule the more virulent; when, however, tested on monkeys there was a more marked difference in pathogenicity, these animals resisting doses of *abortus* a thousand times stronger than those required to ensure infection with *M. melitensis*, and the same is probably the case in infection of man, though of this there is as yet no experimental proof.

Differences of pathogenicity are not necessarily a proof of specific difference between the organisms; the author states that the difference is not greater than that found in different strains of the same organism. He, however, acknowledges that cross immunization experiments are not sufficient to be conclusive. Further work with the two organisms in goats is being carried out as a special study, and is recognized as being very difficult.

[The relationship of the two organisms is without doubt very close but it would be premature to accept their identity until we have further information with human and goat infections. Burnet himself would appear to have modified his views later (see below).]

P. W. B-S.

NICOLLE (Charles), BURNET (Et.), & CONSEIL (E.). **Le microbe de l'avortement épizootique se distingue de celui de la fièvre Méditerranéenne par l'absence de pouvoir pathogène pour l'homme.**—*C.R. Acad. Sci.* Paris. 1923. Apr. 16. Vol. 176. No. 16. pp. 1034–1036. [2 refs.]

The authors were able to determine that various strains of *B. abortus* Bang, obtained from foetal calves and pigs when inoculated into man were non-pathogenic. A dose of 900 millions was used, made from a forty-eight hour culture. With the bovine strains the serum gave at first positive agglutination reactions with both *B. abortus* and *M. melitensis*, but not after the forty-eighth day (two cases); with the porcine strains only one case out of three gave a positive reaction. In no case was there clinical evidence of infection, and the organism was not recovered by blood culture methods.

These results suggest that the *B. abortus* may be substituted for the more dangerous *M. melitensis* for laboratory and diagnostic work.

P. W. B-S.

DENGUE, PAPPATACI, AND UNCLASSED FEVERS.

RICE (Lee). **Dengue Fever. A Clinical Report of the Galveston Epidemic of 1922.**—*Amer. Jl. Trop. Med.* Baltimore. 1923. Mar. Vol. 3. No. 2. pp. 73–90. With 7 charts in text. [11 refs.]

This is a report of the epidemic that occurred at Galveston and district in 1922, of which the author has already described the chief epidemiological features [see this *Bulletin*, Vol. 19, p. 752].

Five hundred and sixty-seven cases were particularly studied, in some of which hourly temperature observations showed a sustained high curve in the early stages. It is noticed that jaundice was almost entirely absent, but that uterine and mucous haemorrhages were not uncommon. The incubation period was 4–14 days, and only a partial immunity of short duration was given.

[The same characters were noted in the widespread epidemic which overran Louisiania, described by SCOTT [*loc. cit.*, Vol. 20, p. 383].

P. W. Bassett-Smith.

CHANDLER (Asa C.) & RICE (Lee). **Observations on the Etiology of Dengue Fever.**—*Amer. Jl. Trop. Med.* Baltimore. 1923. May. Vol. 3. No. 3. pp. 233–262. With 6 charts. [18 refs.]

A more detailed description is given of the epidemic of dengue described by RICE [see this *Bulletin*, Vol. 19, p. 752], which affected about 600,000 people in Texas. The infecting mosquito was *Aëdes aegypti* [*Stegomyia fasciata*], but no evidence could be obtained in man or in inoculated animals that a leptospira was the causative agent. The incubation period in experimentally infected cases varied from four to six days.

P. W. B-S.

HOLT (W. L.). **Summary of Dengue Research, October to November 13, 1922.**—*Southern Med. Jl.* 1923. Feb. Vol. 16. No. 2. pp. 112–113.

Blood smears and blood cultures were negative. A guinea-pig inoculated on the second day from case 5, showed peculiar motile organisms, which were found also in guinea-pigs and a rabbit inoculated from it; these bodies are described as flagellate and something like trypanosomes.

Small granules and large round nucleated and flagellate bodies were found in various animals, but their etiological significance is not convincing. From the serum of blood taken from a patient, which had been allowed to stand in the ice chest over night, abundant protozoal (?) organisms, amoeboid and flagellate, were found, similar to those seen in guinea-pigs and rabbit.

[These findings must be confirmed before being accepted, as the flagellates suggest the appearances described by NUTTALL, commonly seen in any blood that has stood for some time, and are mechanical, not vital; for the others, Fallacies and Puzzles in Blood Examination, by A. BALFOUR, might be usefully studied.]

P. W. B-S.

KAKU (Tokue). **Ueber das Denguefieber.**—*Deut. Med. Woch.* 1923. Apr. 6. Vol. 49. No. 14. pp. 441–442.

The author describes a small epidemic of dengue, uncommon in Japan, between the 8th and 20th June, 1922. There were 16 cases, all soldiers of one Company. The fever was of two types, with a single or less commonly a double wave. Slow pulse, joint-pains (13 out of 16), hyperaesthesia of the skin, and an exanthem were noted. In 13 of the cases the urine gave a positive diazo reaction, and in one case the leucocytes were 3,300. He states that the disease was not contagious, but was due to insect bites.

[An epidemic limited to 16 cases spread over 12 days is unlike true dengue, and suggests the spirochaetal fever of IDO, ITO, and WANI.]

P. W. B-S.

i. PEDRO (Antonio). **O dengue em Nictheroy.**—*Brazil Medico.* 1923. Mar. 31. Year 37. Vol. 1. No. 13. pp. 173–177.

ii. GOTO (K.). **On an Epidemic of Dengue Fever on the Pescadores in 1922.**—*Taiwan Igakkai Zasshi.* (*Jl. Med. Assoc. Formosa*). 1923. Mar. No. 227. [In Japanese, English Summary, p. 3.]

i. The author had 55 cases under his care which at first were diagnosed as atypical influenza, but proved to be dengue. Brief records are given of 12 of them together with the differential leucocyte counts.

ii. In an epidemic of dengue fever in the Pescadores (off Formosa) about one-third of the inhabitants were affected. The attacks lasted from 5 to 20 days. There was practically no mortality.

P. W. B-S.

LE COMTE (A.). **Unclassed Fevers.**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1923. Vol. 63. No. 1. pp. 24–26. With 1 text fig.

This paper describes a fever type which shows such a striking likeness to dengue, that the light intestinal symptoms and the absence of the terminal rise of temperature (terminal rash present) could hardly justify its description as a separate clinical entity.

W. J. Bais.

BOYD (J. E. M.). **Notes on the Sandfly Group, and some Observations on the Sandfly Fever at Hinaidi Cantonments, 'Iraq.**—*Jl. Roy. Army Med. Corps.* 1923. May. Vol. 40. No. 5. pp. 350–358. With 2 text figs.

This contains little that has not already been reported. The observations were made on the left bank of the Tigris, seven miles south of Bagdad. Only two species of phlebotomus were found, *P. papatasii* and *minutus*, the latter being very scarce. It is stated that the slightest wind prevented the flies coming out, but if the electric fans in a room stopped, they arrived in hundreds and found their way inside mosquito netting with a mesh of twenty-two holes to the inch. It was not until one month after the first sandflies were seen that a case of fever was reported. No repellents were found of use.

P. W. B-S.

STEPHENS (E. A.). **Some Observations on a Pappataci-like Fever occurring in Cuba.**—*U. S. Nav. Med. Bull.* 1923. Mar. Vol. 18. No. 3. pp. 368–370.

In a force landed at Guantanamo bay, Cuba, a small outbreak of a short fever was noted in which the symptoms were very similar to those of phlebotomus fever. The ten patients had been severely bitten by midges, the most common being *Oecacta furens*. All forms of mosquitoes and phlebotomi are stated to have been absent. It was thought that the midges were the carriers of the disease.

P. W. B-S.

LLOYD (I. H.). **Nervous sequelae of Phlebotomous Fever.**—*Jl. Trop. Med. & Hyg.* 1923. Apr. 2. Vol. 26. No. 7. pp. 110–111.

The nervous sequelae, which last 14 to 21 days, are headache, insomnia, mental depression, moroseness, impaired concentration, irritability, and diurnal sleepiness. The reflexes are sluggish. The disease can *per se* induce neurasthenia of any degree.

P. W. B-S.

STOCKER (C. J.). **Bacteriological Notes on an Epidemic of Seven Day Fever.**—*Indian Med. Gaz.* 1923. Mar. Vol. 58. No. 3. pp. 97–99. With 6 charts.

In 1914 an outbreak of a dengue-like fever occurred in the 79th Carnatic Infantry. There were 120 cases between March 9th and the end of July; the first case noticed the day after leaving Bombay and the majority after landing at Rangoon. The chief features were leucopenia, an exanthem, and an irregular fever sometimes of a saddle-back type. Blood cultures were taken from 27 cases, and in 6 a Gram-negative, motile bacillus was obtained which did not ferment glucose, lactose or saccharose. This agglutinated with serum of other cases in dilutions from 1 in 40 to 1 in 160, and from it a sensitized vaccine was made, which appears to have been useful. During the early part of the period at sea, *Culex fatigans* was abundant, but after reaching Rangoon, *Stegomyia fasciata* was the most common mosquito. From the stomachs of these a very similar organism was isolated.

P. W. B-S

VAN DER HOEK- VAN EELDERS (H. G. C.). **Een bijdrage tot de differentieele diagnose tusschen van der Scheersche koorts en Influenza in 't beginstadum bij kinderen.** [The Differential Diagnosis between van der Scheer's Fever and Influenza in the Early Stage in Children.] —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1923. Vol. 63. No. 1. pp. 93–94.

In influenza the buccal mucosa is deep red in a well-marked narrow zone round the arcus palatoglossus. In van der Scheer's fever the whole of the buccal mucosa is very red and swollen.

W. J. Bais.

i. HONE (Frank S.). **A Further Series of Cases closely resembling Typhus Fever.**—*Med. Jl. Australia.* 1923. Apr. 21. Year 10. Vol. 1. No. 16. pp. 435–443. With 1 text fig. [1 ref.]

——. **A Problem in Epidemiology.** [? Typhus.]—*Health.* Melbourne 1923. June. Vol. 1. No. 6. pp. 153–157. [1 ref.]

ii. BULL (Lionel). **Serological Examinations.**—*Med. Jl. Australia.* 1923. Apr. 21. Year. 10. Vol. 1. No. 16. pp. 443–445. [1 ref.]

i. The author has described 17 cases of a typhus-like fever in the Adelaide district [see this *Bulletin*, Vol. 19, p. 754]. He now records 20 other cases, under observation during the past year. The disease was wider spread ; it is more prevalent in late summer and autumn, though cases occur all the year round ; age and sex are indifferent. For diagnosis, the two most helpful factors are an early leucocytosis, 10,000 to 12,000 in the first week, and in the second week a definite positive Weil-Felix reaction ; as the diagnosis has chiefly to be made from typhoid, these are very important. No causal agent could be ascertained and no insect carrier traced, though much time was spent on the research. The original flour theory has broken down.

ii. The technique for carrying out the Weil-Felix reaction is described, and the author makes the interesting observation that better results were obtained by keeping the tubes for two hours at 37° than at 54°. In the cases tested the titre varied from 1 in 80 to 1 in 10,000. Agglutinins appeared in the blood about the 8th day, at first weak, increasing in convalescence, to disappear 4–5 weeks after the commencement of the illness. In routine examination of all Widal cases, 70 sera gave negative results. The *B. proteus* X_{19} emulsion for the test should not be formalized, but be made from living young cultures ; generally more than one examination is necessary, and a dilution of over 1 in 40 is required for a positive reaction.

P. W. B-S.

LAGRANGE (E.). **A propos d'un cas de pseudo-typhus en Annam.**—*Bull. Soc. Path. Exot.* 1923. Feb. 14. Vol. 16. No. 2. pp. 105–110. [19 refs.]

The author describes a case of a peculiar fever at Nha-Trang, at first diagnosed as malaria, then plague, typhoid, and finally as pseudo-typhus. There was a primary inoculation (from bite of some insect undetermined), glandular enlargement, high fever, toxic symptoms, exanthem, followed by convalescence after 14 days of severe illness. The original sore became necrotic. As the case was single the diagnosis was extremely difficult, but finally it was little in doubt.

P. W. B-S.

ROCKY MOUNTAIN SPOTTED FEVER.

PARKER (R. R.). **Transmission of Rocky Mountain Spotted Fever by the Rabbit Tick** *Haemaphysalis leporispalustris* **Packard.**—*Amer. Jl. Trop. Med.* Baltimore. 1923. Jan. Vol. 3. No. 1. pp. 39–45. [3 refs.]

The correctness of the view held by the author that the various wild rabbits of Montana were able to maintain the virus of Rocky Mountain fever in the endemic area was fully demonstrated by his experiments. The common rabbit tick, *Haemaphysalis leporispalustris,* transmitted the disease from rabbit to rabbit without the intervention of human infections. A second form, the wood tick, *D. venustus,* is alone responsible for conveying the disease from rodents to man ; thus two ticks are implicated, the rabbit tick tending mostly to disseminate the infection in wide endemic areas in which for a time human cases may not be found.

P. W. Bassett-Smith.

SPENCER (R. R.) & PARKER (R. R.). **Rocky Mountain Spotted Fever : Infectivity of Fasting and recently Fed Ticks.**—*Public Health Rep.* 1923. Feb. 23. Vol. 38. No. 8. pp. 333–339. [2 refs.]

A careful series of experiments with healthy guinea-pigs was carried out to determine the relative values of inoculation of the macerated tick contents and feeding as a means of conveying Rocky Mountain fever. The criterion of infection was the development of the disease in the animal, or causation of immunity. The results showed that it was unwise to rely either on feeding or inoculation alone, but the latter method is reliable if tested with recently fed ticks, that is, when the virus has been "reactivated." An infected fed tick contains virulent fever-producing virus, while the unfed infected ticks contain a non-virulent immunity-producing virus. This fact explains the comparatively small number of human cases, and the long period of attachment which is usually necessary to cause infection. It also suggests the possibility that the virus may sometimes die out in the tick when unfed for long periods, "reactivation" by ingestion of blood not having taken place. The same loss of virulence occurs in infected eggs which have been dried for four months ; these when injected will give rise to immunity but not to fever.

P. W. B-S.

KELLY (Frank L.). **Weil-Felix Reaction in Rocky Mountain Spotted Fever.**—*Jl. Infect. Dis.* 1923. Mar. Vol. 32. No. 3. pp. 223–225. [7 refs.]

The serum of nine cases of Rocky Mountain spotted fever was tested for evidence of the Weil-Felix reaction. The results were almost uniformly negative, and indicate that the reaction may be of value in differentiating the local fever from typhus.

P. W. B-S.

WOLBACH (S. B.), PINKERTON (Henry) & SCHLESINGER (Monroe J.). **The Cultivation of the Organisms of Rocky Mountain Spotted Fever and Typhus in Tissue Cultures.**—*Proc. Soc. Experim. Biol. & Med.* 1923. Feb. Vol. 20. No. 5. pp. 270–273.

Tissues from infected adult guinea-pigs, taken from the tunica of the testis in those affected with Rocky Mountain fever, and from the

cerebral cortex in those with typhus, were grown in plasma from normal guinea-pigs. The virus of Rocky Mountain fever survives and multiplies up to 14 days, and can be transplanted into fresh plasma. The life of the micro-organism corresponds with the length of the survival of the cells of the culture media; multiplication takes place in the endothelial cells of the blood vessels and continues in wandering cells of the same origin. Filamentous forms are occasionally found, like those of *R. prowazeki* as seen in infected lice. With typhus, successful growth for one generation only was obtained and infection of guinea-pigs took place after 8, 11 and 14 days' incubation. Rickettsia bodies were found in sections of the brain cultures, within large wandering amoeboid cells; these cells originate in the blood vessels and meninges. The nerve cells and neurolgia do not survive. The micro-organism of typhus so far has been found to survive in the first generation tissue cultures for 14 days.

P. W. B-S.

NOGUCHI (Hideyo). **Immunity Studies of Rocky Mountain Spotted Fever. I. Usefulness of Immune Serum in Suppressing an Impending Infection.**—*Jl. Experim. Med.* 1923. Mar. 1. Vol. 37. No. 3. pp. 383–394. [22 refs.]

From a large series of experiments the author concludes that a serum protective against the virus of Rocky Mountain spotted fever can be produced in the rabbit, which, if used early, will prevent the virus introduced into a guinea-pig from causing a fatal infection. Within the period of incubation the suppression of the infection is certain, but after the onset of the disease the beneficial effect is nil. As the susceptibility of man and the guinea-pig are so similar, it is recommended that when infection through the bites of ticks or by accident is fairly certain, about 0·2 cc. of the serum per kilo of body-weight (or 0·1 cc. per pound) should be immediately injected, preferably intravenously. For the average adult about 16 cc. would be required.

P. W. B-S.

JAPANESE RIVER FEVER.

ISHIWARA (Kikutaro) & OGATA (Norio). **Vorläufige Mitteilung ueber den Erreger der Tsutsugamushikrankheit.** [The Agent of Japanese River Fever. Preliminary Paper.]—*Cent. f. Bakt.* 1. Abt. Orig. 1923. Apr. 5. Vol. 90. No. 3. pp. 164–167. With 2 plates.

In their experimental work the authors found that guinea-pigs and rabbits were not so satisfactory as monkeys, which, however, were not always obtainable. The virus was present in patients' blood only at the acme of the fever. Cultures made from the blood and injected into the testicle caused enlargement of the organ, the bodies being again found. These in man and monkeys are seen as cocci, diplococci, and in chains, rarely yeast-like, of size from 0·1 μ. to 2·15 μ. The larger ones stain intensely. The small cocci are in enormous numbers in the tissues. They grow best in ascitic fluid media at 30°–32° C., are not like those described by NAGAYO, which are yeast-like and grow

on Löffler's medium ; nor like the coccus of TANAKA, which is Gram-positive. They also differ in morphology and staining from the bodies of MIYAIJIMA. Immunizing work was all negative, and it is impossible to say at present whether the bodies are causative of the disease or not. The plates show (1) the organism in lymph gland of a patient, stained in the block before cutting ; (2) similar conditions in the lymph gland of a monkey ; (3) pure culture in ascitic media from blood of patient [this is not clear].

P. W. Bassett-Smith.

KAWAMURA (Rinya). **On the Relation of the Causative Organisms of Tsutsugamushi Disease and the Blood Constituents, also on Weil-Felix's Reaction.**—*Japan Med. World.* Tokyo. 1923. Mar. 15. Vol. 3. No. 3. pp. 41–45.

Having failed after prolonged observation and experiment to demonstrate that the virus of tsutsugamushi disease was contained in the serum or plasma, although it was present in the whole blood, the author made a thorough examination of the cellular constituents. His experiments proved that the virus was connected neither with the red cells nor with the blood platelets, thus differing from that of typhus, which has been demonstrated by KUSAMA to be in the platelets. By injecting 300 cc. of saline into the peritoneal cavity of infected monkeys and removing the fluid 12 hours later, white cells were obtained which, when centrifuged and injected into non-immune animals, produced the disease in practically the same interval as in control animals when whole blood was used. The virus is found especially in the polynuclear cells, but is not firmly fixed. He found also that a positive Weil-Felix reaction was obtained only up to a dilution of 1 in 50, thus making the test of great value for differentiating tsutsugamushi fever from typhus. The actual causative agent was not isolated nor determined.

P. W. B-S.

OROYA FEVER AND VERRUGA PERUANA.

ARCE (Julián). **Apreciaciones generales sobre el diagnóstico y la clínica. La verruga peruana no genera esplenomegalia.** [General Diagnostic and Clinical Observations. Peruvian Wart does not cause Splenomegaly.]—*An. Facul. de Med. Lima.* 1921. Jan.–Feb. Vol. 4. No. 19. pp. 5–22. With 3 text figs. [1 ref.]

The author evidently does not accept the well-grounded conclusion of the expedition of the Harvard School of Tropical Medicine (1913) that Carrion's disease and verruga peruviana are distinct diseases [see this *Bulletin*, Vol. 7, p. 70, and elsewhere]. Consequently it would only tend to confusion to publish an abstract of his paper.

A. G. B.

ARCE (Julián). **Profilaxis de la verruga peruana, basada en los caracteres etiológicos y epidemiológicos propios de esa enfermedad.**—*An. Facul. de Med. Lima.* 1922. May–June. Vol. 5. No. 1. pp. 58–70. With 1 text fig. [English Summary pp. 73–75.] [4 refs.]

The author describes verruga peruviana or Carrion's disease as having two definite and independent clinical forms, with all the characters of a protozoal disease transmitted by a blood-sucking insect. He states that the etiology is not yet known, for he does not accept *Bartonella bacilliformis* of BARTON and STRONG as proved. He suggests a further detailed study of the various infected zones by organizing a corps of expert investigators to determine the differences between the infected and non-infected regions, and he thinks that the money spent would be well invested.

P. W. Bassett-Smith.

ARCE (Julián). **Un caso de Malaria crónica y verruga peruana. Ataque pernicioso de forma comatosa, atribuido al desarrollo de verrugas cerebrales. Interpretación errónea de la hipertrofia esplénica propia de la malaria crónica, atribuida, igualmente, a la enfermedad de carrión.** [Chronic Malaria and Verruga Peruviana. Cerebral Symptoms and Enlarged Spleen erroneously attributed to Carrion's Disease.]—*An. Facul. de Med. Lima.* 1922. Nov.–Dec. Vol. 5. No. 4. pp. 332–343.

A lengthy description of the case of a woman, aged 30 years, a chronic malarial subject, who had a mild attack of verruga peruviana in October, 1920. The following April cerebral symptoms suddenly supervened after repeated attacks of fever which yielded temporarily to quinine. These attacks and the later cerebral symptoms were ascribed to verruga peruviana [*i.e.* Oroya Fever] and a fatal issue was predicted. Injections of quinine and of cacodylate of sodium resulted, however, in recovery, and later crescents were found in the peripheral blood. The author states that splenomegaly does not occur in Oroya fever unless the patient is also a malarial subject.

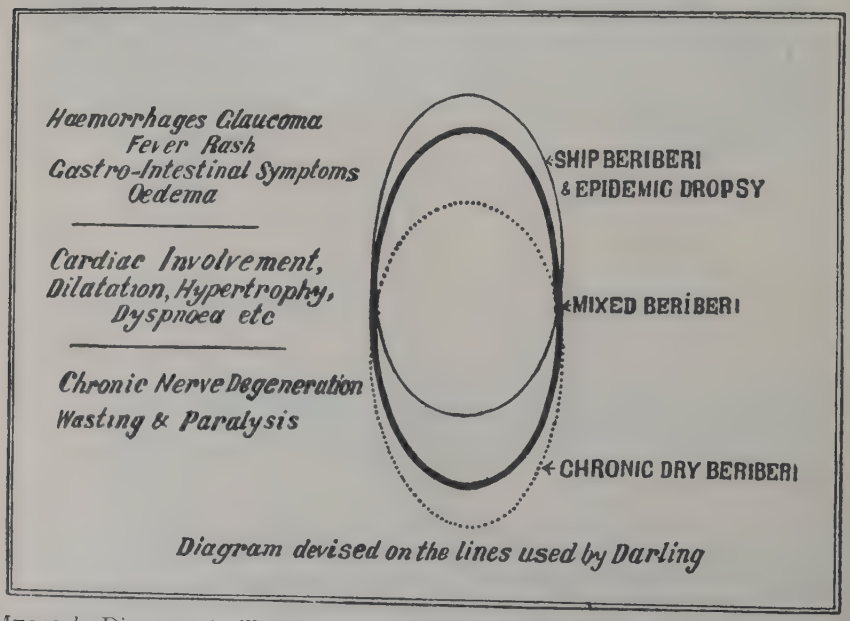
H. Harold Scott.

BERIBERI.

MEGAW (J. W. D.). **The Beriberi and Epidemic Dropsy Problem.**—*Indian Med. Gaz.* 1923. Apr. & May. Vol. 58. Nos. 4 & 5. pp. 145–151. With 1 text fig.; 193–203.

The questions propounded in this purely ratiocinative paper are: (1) Is epidemic dropsy a form of beriberi? (2) Is avian polyneuritis the same disease as beriberi? (3) What is the probable cause of beriberi?

1. In approaching the first of these questions, the author dwells upon the ambiguity of accepted definitions, and upon the absence of generally recognized boundaries between the various manifestations included in the terms "beriberi" and "epidemic dropsy," and, in the case of "beriberi," on the great differences between various outbreaks and between individual cases in the same outbreak. He then compares the two diseases in considerable detail in their geographical and seasonal distribution and in their range of symptoms, tabulating the salient symptoms of particular outbreaks of each disease, and he comes to the conclusion that though in the extremes of "beriberi" and "epidemic dropsy" the clinical pictures may be very different, yet that these extremes so inter-graduate as to justify the view that "the diseases have not yet been shown to be different entities." The author illustrates his own views as to the inter-relations of the two different types of what he evidently regards as etiologically one disease in the accompanying diagram, and for his own part he thinks that in "beriberi" observations due consideration has not been given to such easily recorded and distinctive points as pulse rate, blood pressure, nitrogen content of the blood, and post-mortem changes in the heart.



MEGAW's Diagram to illustrate inter-relations of beriberi and epidemic dropsy.

[Reproduced from the *Indian Medical Gazette*.]

2. As regards the second question, the author argues that the experimental polyneuritis of animals has been assumed to be identical with beriberi mainly because the two diseases have as common phenomena a degeneration of peripheral nerves associated with a diet of rice (particularly polished rice) and curable by a change of diet. To this argument he objects (1) that polished rice, being deprived of its natural protective layers, is not only deficient in the foodstuffs embodied in those layers, but is also liable to suffer subtle deterioration from moisture and the assaults of microbes; (2) that the vitamin B, in which also polished rice is deficient, is a something about which little is known, and that little not very exact; and (3) that the post-mortem changes in the heart and other tissues are not at all the same in the two diseases. Therefore "it is not safe to conclude that human beriberi is the same as animal avitaminosis." It also is common knowledge that peripheral nerve degeneration is a feature of many forms of chronic intoxication.

3. In the consideration of the third question the argument runs in well-beaten paths, the author passing in review and discussing the evidence for and against the chief theories of causation of beriberi (apparently assuming that beriberi and epidemic dropsy are identical). He does not admit the *all sufficiency* of the vitamin B deficiency theory; he is not disposed to ignore entirely the intestinal intoxication factor; and he leans strongly towards the rice-intoxication theory, the toxin, in his opinion, being formed in old rice particularly when it is not stored in the form of paddy. (1) As regards the vitamin B deficiency theory, he allows that vitamin deficiency may play an important part in some outbreaks of beriberi; but he again touches on the haziness of the particular vitamin B, and insists on the fact, within his own experience, that many cases of beriberi have an incubation period far too short to be attributed to vitamin deficiency; furthermore, he analyses the well-known experiments of STRONG and COWELL on the Bilibid prisoners, pointing out that the experimental diets appear to have been by no means devoid of vitamin B, while their protein value was low, and suggesting that the puzzling symptoms recorded might imply a concurrent protein starvation. (2) In discussing the rice-intoxication theory, he emphasizes the following points as congruent with that theory: the gastro-intestinal irritation followed by neuritis and cardiac implication; the general resemblance of symptoms to those of such intoxications as alcohol, arsenic, or ergot; the seasonal association of the disease with the time when old stored rice comes into use; the often sudden appearance of the disease among people whose diet exhibits no obvious change, or among people whose diet is richer than that of their neighbours both in nutritive value and in vitamin B; the repeated appearance of the disease in ships like the R.I.M.S. "Investigator" [in the reviewer's personal experience of four years a well-found ship, lavishly and luxuriously rationed according to Indian native standards], and its frequent reappearance in particular houses; the ratio of the severity of the disease to the amount of incriminated rice consumed; the shortness of incubation in certain well authenticated cases; the implication of sucklings of affected mothers; and the freedom of Calcutta from the disease since the establishment of numerous rice mills where rice is stored as paddy and whence it issues in a constant stream in the prepared form. Of infantile beriberi he has no personal experience; but he remarks that "if [it] is a vitamin deficiency disease it is remarkable that the cardiac condition should be so different from that of animals suffering from avitaminosis."

An objection to the rice-intoxication theory, that beriberi (including epidemic dropsy) has occasionally occurred in persons who do not usually eat rice, is met by the mere surmise that rice may have been used as an adulteration of other flour.

In thus supporting the rice-intoxication theory, the author does not ignore the anti-neuritic accessory food factor and suggests that deficiency of vitamin B may play a part similar to that taken by malnutrition in dysentery. Nor does he overlook the importance of the objection that no poison, or poisons, have yet been traced.

The paper is characterized throughout by temperance and judgement, and gives us the reflections of a humane mind, though not, perhaps, of that type of humane mind, applauded by HOBBES, whose delight centres unswervingly in exact definitions "purged and snuffed from ambiguity."

A. Alcock.

MEGAW (J. W. D.) & BANERJI (R. N.). **Two Family Outbreaks of the Epidemic Dropsy Type of Beri-beri.**—*Indian Med. Gaz.* 1923. Feb. Vol. 58. No. 2. pp. 49–51.

In 1919–20 Banerji found 12 persons in one family at Allahabad suffering from gastro-intestinal symptoms, swelling of feet and legs, irregular fever, and tendency to haemorrhages in the skin, mucous membranes, and eye; in 10 of the 12 the knee reflexes were increased, in the other 2 absent. There were two deaths. The disease was evidently attributable to the rice ration, as the severity of the case was proportional to the amount eaten, and recovery followed its prohibition. In Megaw's group, also at Allahabad, there were four of one family less severely affected than the first, with no haemorrhages, but absent knee jerks; the best polished rice was said to have been used.

The authors state that at present epidemic dropsy cannot be differentiated from beriberi. In the cases reported there was no evidence of vitamin deficiency; the same food had been used for years, and often neighbours who did not suffer had a less satisfactory diet; one patient contracted the disease after *only a few days'* residence in the town. They considered it to be not infectious but due to some accidental contamination of part of the rice, perhaps caused by the hoarding of the sample to obtain a higher price.

These outbreaks are evidence that epidemic dropsy and beriberi are caused by a poison germinating in rice under certain conditions, and point to the necessity of a reconsideration of our views on the epidemiology of beriberi.

P. W. B-S.

i. JANSEN (B. C. P.). **On the Need of Anti-Beri-Beri Vitamin of the Animal Organism and on the Amount of this Vitamin in Different Foodstuffs.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl. -Indië.* 1923. Pt. 1. pp. 1–122. With 2 charts. [60 refs.]

ii. ——. **On the Nutrient Value and the Ferment-Content of 100 Years Old Rice.**—*Ibid.* pp. 123-135. [7 refs.]

i. In this very elaborate investigation of various foodstuffs used by the people, the author found that mammals in general were not reliable for the tests, and he, therefore, used pigeons throughout. He states that the quantity of anti-beriberi vitamin needed daily by a pigeon is not a constant factor, but depends upon (1) the amount of food

taken daily; if the composition of the food is unaltered the amount of the vitamin needed is proportional to the quantity of food taken; (2) the kind of food; the variations are great and it cannot as yet be stated how much vitamin will be required. After testing a large number of foods he shows that in the great majority of accessory foodstuffs the vitamin value is very low and his hope of finding one which would supply the want when the diet is polished rice was not fulfilled. The best was djawawut, but this is little cultivated. The following have (*a*) more vitamin than is required for their own metabolism: bran, djawawut, eggs, meat (heart, etc.), katjangidjo, pea-nuts, kanari beans; (*b*) enough for their own metabolism only: maize, unpolished rice, milk, boiled and canned potatoes, fresh coconut, soy beans, tempe kedele; (*c*) not enough vitamin for own metabolism: white bread, maize-meal, banana, coconut cake, sage, cassava, shrimps, etc.

ii. The writer adds an extraordinary statement that a sample of rice that, owing to insuperable difficulties of transport, had been stored as paddy for 100 years on the extremely fertile plateau of Korintji, was found on recent investigation to have lost, as compared with new rice, none or little of its antiberiberi vitamin, to have suffered little or no change in the composition and digestibility of its protein and in its vitamin A content, and still to contain its natural ferments.

[Of course one would like to have these astonishing results confirmed.] P. W. B-S.

OKADA (Seizaburo), SAKURAI (Eiichi), IBUKI (Tsukio) & KABESHIMA (Harutoshi). **On the Basal Metabolism in Vitamine B Starvation and in Beri-beri.**—*Japan Med. World.* Tokyo. 1923. May 15. Vol. 3. No. 5. pp. 102–104. [4 refs.]

An investigation was made in mild cases of beriberi with normal or nearly normal basal metabolism, to determine whether changes occur in the basal metabolism as expressed by variations in the respiratory exchange in vitamin B starvation. The main diet was well-polished rice with vitamin-free accessory foods. The analysis of the expired air was made with Haldane gas apparatus.

Seven cases of vitamin B starvation all showed a lowered metabolic activity, which rapidly became normal on vitamin B preparations being supplied. Five of the seven of this group were diagnosed as beriberi and showed at first a normal rate, but when placed on a vitamin B deficiency diet the rate rapidly fell; one of the others was a healthy male; the last a case of ankylostomiasis. Of 28 cases of beriberi (and also in out-patients with marked symptoms) about half showed normal metabolic values; in some a marked diminution occurs in the course of the disease and generally accompanies paralysis and atrophy. The fact that about 80 per cent. of early beriberi cases show a normal rate, indicates that the essential cause is not vitamin B starvation, but further experiments are required to show whether the later symptoms are not due to this deficiency. P. W. B-S.

KORENCHEVSKY (V.). **Glands of Internal Secretion in Experimental Avian Beri-beri.**—*Jl. Path. & Bact.* 1923. July. Vol. 26. No. 3. pp. 382–388. With 2 plates. [6 refs.]

The author used 54 pigeons in the investigation. The basal diet was polished rice; cod liver oil and citrated lemon-juice were added

to provide vitamin A and C, with the addition of autolysed yeast to the controls. The birds were killed in from 24 to 46 days and the glands with internal secretion were removed for examination. The most characteristic changes were (1) hypertrophy of suprarenals, (2) atrophy of thymus, (3) atrophy of spleen with persistence of the islets of the germ centres, often with an increase in their number and size, and frequently hypertrophy and hyperplasia of the islet cells. Other changes not so far considered to be characteristic were (1) presence of a stage of great activity in the thyroid when on a beriberi diet deficient in the fat-soluble factor; (2) tendency to hypertrophy and hyperplasia of the inner secretory interstial cells of the testicle; (3) increased number and hypertrophy of the large light cells of the pituitary body. The thickening of the walls of the small arteries due to hypertrophy of the media and adventitia as observed by YAMAGIWA in man, and in avian beriberi by McCARRISON, which is one of the fundamental lesions in beriberi, was seen in some of the pigeons.

Two excellent plates show the changes in the testicle, pituitary and spleen.

P. W. B-S.

OGATA (Tomosaburo), KAWAKITA (Shintaro), SUZUKI (Tsui), KAGOSHIMA (Shigeru) & OKA (Chido). [**Our Hypothesis on the Pathogenesis of Beri-beri based on the Experimental Results obtained by our Experimental Vitamine B Deprivation.**]—*Iji Shimbun* (*Med. News.*). 1922. Dec. No. 1107. [Summarized in *Japan Med. World.* Tokyo. 1923. May 15. Vol. 3. No. 5. pp. 106–107.]

The experiments of the authors showed that the results produced by a dietary of polished rice in (so-called) polished rice disease or vitamin B starvation, were different from beriberi. In beriberi the vitamin B content of the viscera is not as a rule different from the normal, the nervous symptoms develop early, and anaemia is not a noticeable factor; whereas in deprivation of vitamin B, anemia is always developed, with a marked change in the white cells, and the nervous symptoms occur later. They, therefore, do not accept the deficiency of vitamin B as a cause of beriberi, but believe that it may be due to an intestinal auto-intoxication from an organism which contains a neurotoxin. [Hamilton WRIGHT's theory.]

P. W. B-S.

i. SAKAI (Masaji). [**Electrical Examination of Nerve Lipoids with Special Reference to Beriberi-like Disease of Fowls and of Human Case of Beriberi.**]—*Okayama Igakkai Zasshi.* (*Jl. of Okayama Med. Soc.*) 1922. Oct. No. 393. [Summarized in *Japan Med. World.* Tokyo. 1923. Feb. 15. Vol. 3. No. 2. p. 33.]

ii. IKUCHI (Ken). [**Contributions to the Knowledge of Blood Findings in So-Called Meningitis and Sucklings' Beriberi.**]—*Osaka Igakkwai Zasshi* (*Jl. of Osaka Med. Soc.*) 1922. Oct. Vol. 21. No. 10. [Summarized in *Japan Med. World.* Tokyo. 1923. Feb. 15. Vol. 3. No. 2. p. 36.]

iii. HASUI (Nawoye). [**Urine Analysis and Metabolic Experiments in Beriberic Cases.**]—*Nisshin Igaku* (*Progress in Med.*). 1922. Oct. Vol. 12. No. 2. [Summarized in *Japan Med. World.* Tokyo. 1923. Mar. 15. Vol. 3. No. 3. p. 61.]

iv. HAYASHI (Tohru). [**Studies on Acidosis in Beriberi.**]—*Iji Shimbun* (*Med. News*). 1922. Dec. No. 1107. [Summarized in *Japan Med. World.* Tokyo. 1923. May 15. Vol. 3. No. 5. pp. 106–107.]

i. The author used for his experiments alcoholic extract from the sciatic nerves of fowls suffering from polyneuritis. This had more negative

charges than had normal nerve, while the serum had less. The negative charge could be made positive by the use of rice bran extract, but the hydrogen-ions were not influenced by them, the alcoholic extract of the diseased nerves having a remarkable H-ion concentration.

ii. In the blood of the meningitis cases basophilic and azurphilic granules with thread granules in the erythrocytes were found, whereas in the blood of suckling (infantile) beriberi only basophilic granules were noted. The condition of the leucocytes was as described by other authors.

iii. The examination of the urine in five cases of beriberi showed that metabolic products are retained in the body. In acute cases the nitrogen constituents and salts are decreased, but during convalescence they are increasingly excreted, first the salts, later the nitrogenous substances. No quantitative change in the secretion of ammonia, amino-acids, or phosphoric acid was detected.

iv. Blood examinations of 82 cases of beriberi showed that in 29 an acidosis was present, diminishing in harmony with the beriberi symptoms. The results of the tests for nitrogenous compounds in the blood were in conformity with those of HASUI.

P. W. B-S.

SCURVY.

EMBREY (Hartley). **The Antiscorbutic Vitamine in some Oriental Fruits and Vegetables.**—*Philippine Jl. Sci.* 1923. Jan. Vol. 22. No. 1. pp. 77–82. With 5 plates. [3 refs.]

The author gives a detailed record with weight-curves of his experiments on guinea-pigs to determine the antiscorbutic value of various foodstuffs. At Manila, of the foods examined, pumelo, cucumber, chico (*Achras sapota*) and guava afforded the most protection ; 10 gm. of each of these given daily protected the animals for nine weeks ; 15 gm. of banana gave similar results ; 15 gm. of kangkong or camote leaves (*Ipomaea*), which are used cooked by the Filipinos as greens, protected for a period of seven to nine weeks. At the Union Medical College, Pekin, 30 gm. of fresh raw persimmon appeared very effective for 24 weeks.

[On a study of the charts it is noticeable that in many instances the weight had fallen markedly at the end of the period, indicating that had the experiment been continued longer the animals would probably have succumbed. Too much value, therefore, must not be attached to the efficacy of the substances given.]

P. W. Bassett-Smith.

GRALKA (Richard). **Ueber die Verteilung des antiskorbutischen Vitamine in frischen Gemusen und aus ihnen hergestellten Dauerpraparaten.** [The Distribution of Antiscorbutic Vitamin in Fresh Vegetable and Permanent Preparations of Them.]—*Jahrbuch f. Kinderheilk.* 1923. Jan. Vol. 100. No. 5–6. pp. 265–280. With 6 charts.

The rapid incidence of scurvy symptoms in 31 male guinea-pigs kept on a basic barley diet, to which was added daily 4 gm. of dried milk, showed that this diet had no antiscorbutic vitamins, though it contained fat-soluble factor, albumen, etc.

A daily ration of 40 gm. of white cabbage or carrot protected, unless these were previously frozen. Fresh pressed carrot juice is rapidly reduced in efficiency by oxidation and drying. He found that vegetable powders were valueless, but a water-containing extract held a certain amount. Rubio, an autolysed carrot extract, contains some, but less protective substance than fresh carrot.

P. W. B-S.

i. LOPEZ-LOMBA (J.) & RANDOIN. **Production du scorbut chez le Cobaye et le Lapin jeune au moyen d'un nouveau régime, complet et biochimiquement équilibré, uniquement dépourvu de facteur C.**—*C.R. Acad. Sci.* Paris. 1923. Apr. 9. Vol. 176. No. 15. pp. 1003–1006. With 1 chart.

ii. —— & ——. **Etude du scorbut produit par un régime complet et biochemiquement équilibré, uniquement dépourvu de facteur C.**—*Ibid.* May 28. No. 22. pp. 1573–1576. With 1 chart.

i. The authors have prepared a basal diet containing haricot beans, which, with the addition daily of 3 cc. of fresh lemon-juice, was able to keep guinea-pigs in perfect health for over 70 days. It has the following composition :—

Flour of white haricots 84 gm.; dried beer yeast 3 gm.; butter fat 4·5 gm.; lactate of calcium 5 gm.; chloride of sodium 1·5 gm.; filter paper 2 gm.

Guinea-pigs on this diet without lemon-juice developed scurvy.

ii. Rabbits and guinea-pigs fed upon a satisfactory diet deficient only in vitamin C showed a loss of weight of from 10 to 30 per cent.; the weight-curve in young rabbits begins to fall in about 38 days, in guinea-pigs in about 14. The softening and loosening of the teeth was noticed in guinea-pigs at all ages, together with the usual bone and haemorrhagic changes. Compared with the control animals, to which lemon-juice had been given, a 40 to 50 per cent. increase was noted in the weight of the suprarenals and thyroids, with little alteration of the kidney and spleen. The testicles lost 12 per cent., the liver about 28, and the thymus about 50 per cent.

P. W. B-S.

MOURIQUAND (G.), MICHEL (Paul) & BERTOYE (Paul). **Accidents scorbutiques chez des Cobayes soumis à un régime antiscorbutique.**—*C.R. Soc. Biol.* 1923. Apr. 21. Vol. 88. No. 13. pp. 1045-1046. [5 refs.]

In a series of 118 guinea-pigs which received the usual basal diet, with from 5 to 40 cc. of fresh lemon-juice, only four showed evidence of scurvy. In the case of each of these there was some unusual circumstance to account for the inefficacy of the antiscorbutic. Therefore 5 cc. or over is protective for as long as 240 days.

P. W. B-S.

LOPEZ-LOMBA (J.). **Prolongation de la survie dans le scorbut chez les cobayes thymectomisés.**—*C.R. Soc. Biol.* 1923. July 7. Vol. 89. No. 24. pp. 370–371. [3 refs.]

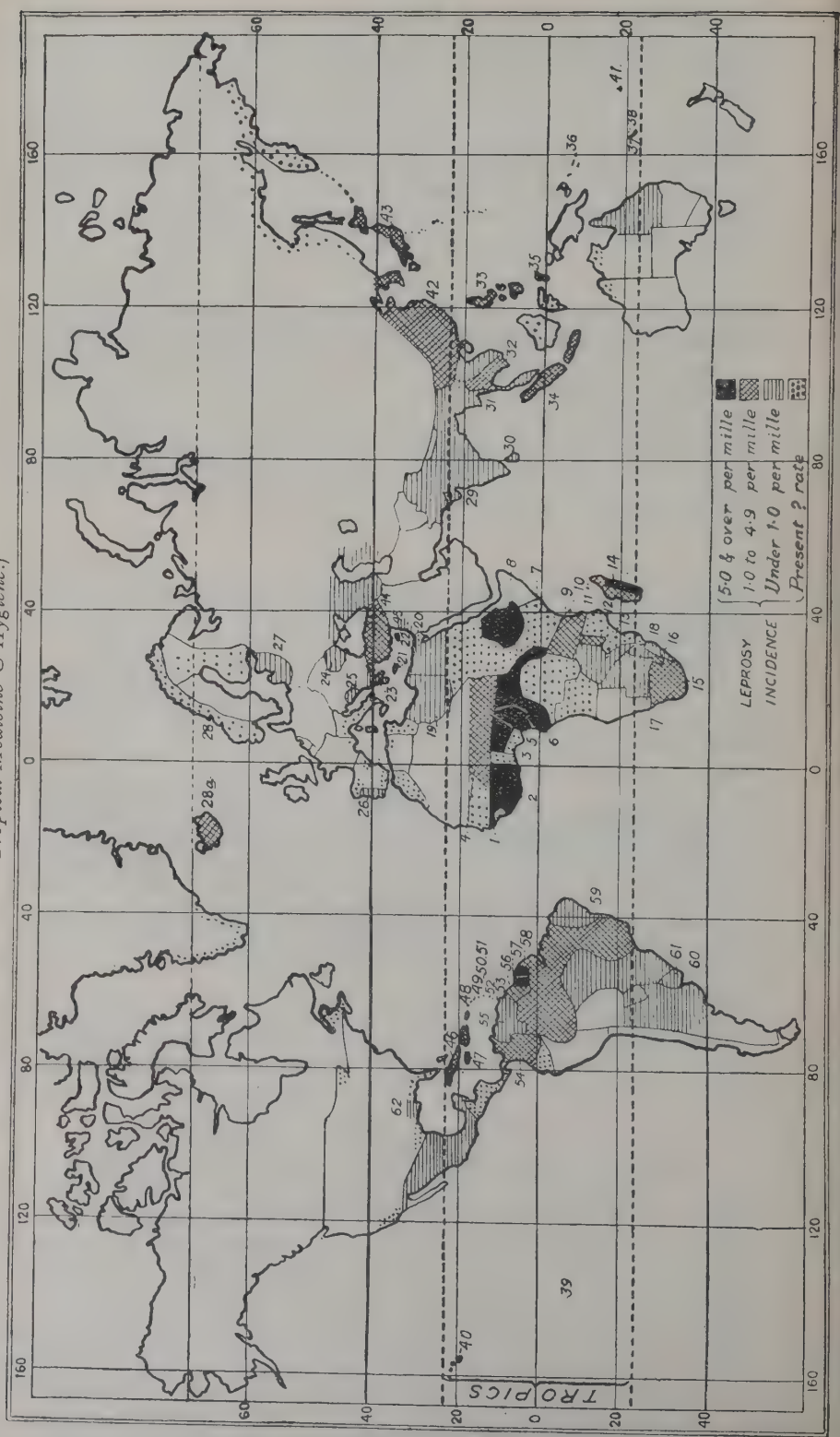
Experiments on guinea-pigs in a condition of avitaminosis showed that in those in which the thymus gland had been removed life was somewhat prolonged; that is, the absence of this hypervagotonic gland was favourable for the animal under scurvy conditions.

P. W. B-S.

LIOTTA (Domenico). **Sullo scorbuto sperimentale. Nota I—Le moderne vedute sulla etiologia dello scorbuto.** [Experimental Scurvy. Note I—Modern Views as to the Etiology of Scurvy].—*Arch. d. Farmacol. sperimentale Sci. affini.* 1923. June 15. Year 22. Vol. 35. No. 12. pp. 184–191. [38 refs.]

A cursory review of the earlier chemical, the vitamin, and the later calcium deficiency theories as to the etiology of scurvy. The author intends in a future communication to relate his experiments in support of the avitamin hypothesis.

H. Harold Scott.



Map to illustrate world distribution of Leprosy. (After Sir Leonard ROGERS' map in the *Transactions of the Royal Society of Tropical Medicine & Hygiene.*)

LEPROSY.

ROGERS (Leonard). **The World Incidence of Leprosy in Relation to Meteorological Conditions and its Bearing on the Probable Mode of Transmission.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. Feb. 15. Vol. 16. No. 8. pp. 440–460. With 3 folding maps. (Discussion pp. 460–464.)

Carefully prepared returns show that in hot, humid climates—the Belgian Congo, Cameroon and the French Ivory Coast, for example—the morbidity of leprosy reaches a high figure; in very dry tropical areas, such as Peru and German South-West Africa, the incidence is low, in fact some parts are free; in southern temperate zones cases are few; in the northern, where there is a higher rainfall, the number is greater; in Iceland, where rainfall is high but the external temperature is low, the dwellings are crowded and the room temperature is high and the atmosphere humid, and to this is ascribed the prevalence of the disease. In sub-tropical zones the rainfall and the leprosy rates are intermediate between tropical and temperate, though, naturally, in countries where the sanitary standard is low, one may see a fairly high leprosy incidence with only a moderate rainfall.

A map, carefully drawn up to illustrate the world distribution of this disease, graphically emphasizes the points dealt with in the text.

The general principles of the first part of the paper are applied in detail to India, upon which country the author from long residence and constant study can speak with authority. Here, again, a clear and well-executed map is of great service.

WORLD DISTRIBUTION OF LEPROSY IN RATES PER MILLE [see Map].

AFRICA.—TROPICAL ZONE.

1. French Guinea	5·0
2. French Ivory Coast	60·7
3. North Nigeria	5·2
4. French Sudan	3·0
5. Cameroon	20·0
6. French Equatorial Africa	13·0
7. East Belgian Congo	200·0
8. Abyssinia	20·0
9. German East Africa	1·0
10. Zanzibar	1·0
11. Comoro Islands	3·5
12. Nyasaland	1·6
13. Rhodesia	0·12
14. Madagascar	3·0

SUB-TROPICAL ZONE.—23½°—40°.

15. South Africa	2·21
16. Basutoland	1·8
17. Bechuanaland	0·08
18. Natal	0·2
19. Tripoli	0·08
20. Egypt	0·58

EUROPE.—SUB-TROPICAL ZONE.

21. Crete	3·0
22. Cyprus	1·06
23. Greece	0·08

TEMPERATE ZONE.—40°—90°.

24. Roumania	0·09
25. Herzegovina	0·59
26. Portugal	0·93
27. Baltic States	0·2
28. Norway	0·03
28a. Iceland	1·1

ASIA AND OCEANA.—TROPICAL ZONE.

29. India	0·32
30. Ceylon	0·16
31. Siam	2·0
32. Cochin China	1·67
33. Philippines	1·3
34. Sumatra	2·1
35. Moluccas	3·5
36. Solomon Islands	4·1
37. New Caledonia	26·0
38. Loyalty Islands	35·0
39. Marquesas Islands	66·7
40. Hawaii Islands (1894)	11·88
41. Fiji Islands	2·9

SUB-TROPICAL ZONE.

42. China	1·0
43. Japan	1·94
44. Asia Minor	1·0
45. Palestine	0·86

WESTERN HEMISPHERE.—TROPICAL ZONE.

46. Cuba	1·3
47. Jamaica	2·0
48. Dutch West Indies	3·3
49. Leeward Islands	1·34
50. Guadaloupe	1·16
51. Martinique	2·9
52. Windward Islands	0·92
53. Trinidad	1·6
54. Colombia	3·0
55. Venezuela	0·21
56. British Guiana	4·0
57. Dutch Guiana	25·0
58. French Guiana	11·0
59. Brazil	0·72

SUB-TROPICAL ZONE.

60. Argentina	0·13
61. Uruguay	0·05
62. Louisiana	0·05

The conditions favouring the spread of leprosy are: high relative humidity, close and continued contact, and type of disease—the nodular being the more infective. The writer gives reasons in favour of dermal inoculation as the portal of entry of the bacillus, thus aligning himself with the great authorities on leprosy. The question of an insect vector receives mention, but no definite conclusions are reached beyond the statement that the moisture and warmth possibly permit a lengthening of the period of viability of the bacillus outside the body, while the abundance of insect life and the frequency of small skin abrasions furnish the most favourable conditions for dissemination, scratching of the bites being the most likely means of inoculation. Prevention of contact between healthy and sick, especially during the more susceptible years, up to 25 years of age, constitutes the primary prophylactic measure.

Getting together the facts on which this stimulating paper is based must have occupied much time and called for unremitting attention to detail. The writer remarks that he will be grateful for further data regarding the incidence of leprosy in any part of the world.

H. Harold Scott.

i. Robineau (M.). **La lèpre dans la circonscription d'Ebolowa (Cameroun).**—*Bull. Soc. Path. Exot.* 1923. Mar. 14. Vol. 16. No. 3. pp. 193–202. With 3 text figs.

ii. ——. **Quelques remarques cliniques sur la lèpre observées à Ebolowa (Cameroun).**—*Ibid.* Apr. 11. No. 4. pp. 231–236. [3 refs.]

iii. ——. **La lutte contre la lèpre au Cameroun.**—*Ibid.* pp. 253–255.

i. Ebolowa is a well-wooded, mountainous and marshy area in the south of the Cameroons with a hot, humid climate, where the negro population live under most miserable conditions favouring the spread of infectious diseases, and leprosy is very common. From 1 to 2 per cent. of the inhabitants are affected in some areas, while in the Garoua district in the north of the Cameroons 4,860 lepers are present, and in the Ebolowa district they are estimated at 1,500, half of whom are segregated, which gives a percentage of 13 in a population of 106,246 [one of the highest rates in the world]. The neighbouring leprosarium at Yedjang will hold 400, and is well equipped with hospital (medical visits twice a week), dispensary, school, crèche for the infants from their birth, and land for cultivation. The patients on arrival receive seed for their crops and food for the first three months, after which they grow their own food. The number of admissions on a voluntary basis is increasing and desertions are rare. A separate institution for advanced maimed cases with supplies of food is maintained at Ngalan, and two others shelter 247 and 45 patients respectfully. There are also five less efficient leper villages, much being thus done to control and care for the lepers.

ii. In Yedjang, macular leprosy constituted 64 per cent. of the cases, and was either circumscribed or diffuse, but without nodular formation and was nearly equally frequent in males and females; maculo-atrophic leprosy formed 33 per cent. and was more common in females, being frequently accompanied by atrophic lesions of the hands and feet, while tubercular and pigmented leprosy was rare. Leprosy differs from syphilis in being progressive instead of retrogressive. A mixture of ajouni 60 gm. and eucalyptol 40 gm. was injected 1,021 times

without accident; chaulmoogra oil 159 gm., 95 per cent. alcohol 30 gm. and ether 35 gm. 4,382 times without sterilization, with 7 abscesses; and atoxyl 10 gm., arrhenal 5 gm. and water 200 gm. 2,898 times without accident—all intramuscularly. The results in 117 cases are given as follows: 13, or 22·4 per cent., of 59 macular cases cleared up, and have been sent back to the villages, while one maculo-atrophic cleared up and 31 more were greatly improved.

iii. All the lepers segregated in scattered villages ought to be collected in leprosaria, as in Madagascar, where 1,424 are isolated in one and 627 in another institution, and at Culion with 8,000 lepers, which simplifies administrative control, supplies more agreeable conditions, and should include a hospital for treating intercurrent diseases, a school for the children, a crèche for infants, and a market. They should be agricultural colonies with land to cultivate, those able to work being separated from the maimed and weak who cannot do so. An estimate given for a colony of 300 lepers works out at 56·25 francs for the first year and 33·45 for succeeding years, so that for the dozen colonies required for the Cameroons the cost would be 270,000 francs the first year and 160,000 francs yearly afterwards.

Leonard Rogers.

MONTPELLIER (J.). **Au sujet de la lèpre en Algérie.**—*Bruxelles-Mèdical.* 1923. May 3. Vol. 3. No. 27. pp. 658–660. [4 refs.]

Leprosy is rare among the indigenous inhabitants of Algeria, but not so infrequent among Spanish, South American, Maltese and Italian immigrants. In 1918 the author collected records of over 120 cases in Europeans, and now adds details of three new cases—two in Spaniards and one in a Maltese.

L. R.

VALVÊRDE (Belmiro). **La lèpre au Brésil.**—*Presse Méd.* 1923. July 4. Vol. 31. No. 53. (Supplement.) pp. 1105–1108. With 2 text figs. [6 refs.]

Leprosy has been known since 1650 in Rio de Janeiro and is now widespread, its relative prevalence in different States of Brazil having been given in a review of a paper by the same *author* in this *Bulletin* [Vol. 20, p. 482]. The known figures are mentioned in this paper, Para State having 1,452 and San Paulo 3,028, the figures being only fairly complete in these states, out of a total known cases of 7,026, the real number for Brazil being put at 15,000. In Rio de Janeiro, 84 of 88 cases showed nasal lesions, and the author favours the view that this is often the seat of the primary infection, which he attributes to direct transmission, and he does not agree with LUTZ's theory that it is conveyed by Culicidae. Treatment by ethyl ester chaulmoograte has recently been commenced on a large scale and promises well.

During the last four years there has been great activity in providing for the segregation of lepers in institutions in Para, Maranhao, Minas-Geraes, where six million francs are being spent, and at Rio de Janeiro. The new leprosarium at Santo-Angelo, San Paulo State, on which nearly 30 million francs are being spent, will be the finest and best equipped in the world, with ample land around it.

L. R.

LEGER (Marcel). **Comment concevoir la lutte contre la lèpre dans les Colonies françaises?**—*Bull. Soc. Path. Exot.* 1923. Mar. 14. Vol. 16. No. 3. pp. 215–221. [6 refs.]

A general survey of measures against leprosy in the French colonies commences with the statement that in spite of numerous regulations the results are minimal or nil. By learning from former mistakes, a rational and scientific prophylaxis can, however, be formulated, which must primarily be based on efficient treatment of the patients, controlled by accurate bacteriological diagnosis. Dispensaries should be opened with clinical laboratories for the treatment of skin diseases, and hospitals under favourable conditions on the lines of tuberculosis sanatoria, to which lepers will be attracted by the hope of cure. These will be adapted to the customs and social conditions of the individual patients and the stage of the disease, treatment with the various soluble products of chaulmoogra and hydnocarpus oils being supplied.

L. R.

NOËL (P.). **Etiologie et prophylaxie de la lèpre.**—*Rev. Prat. Malad. des Pays Chauds.* 1923. Feb. pp. 50–65. [13 refs.]

After discussing the communicability of leprosy this paper deals with prophylaxis on much the same lines as the above writers, but domicile isolation is advocated for the well-to-do. It is essential to provide better conditions in the leper colonies than the people have in their villages, and the best treatment in order to attract the patients, agricultural colonies being best. Owing to the high mortality among infants separated from their parents at birth and brought up in institutions, he advises, as better, as well as more economical, their being brought up by healthy relatives.

L. R.

BERNUCCI (Felice). **Osservazione sulla innervazione cutanea nella lebbra.** [Cutaneous Innervation in Leprosy.]—*Sperimentale.* 1923. June 18. Vol. 77. No. 1–2. pp. 57–74. With 1 plate. [25 refs.]

In view of the fact that some authorities have stated that leprous nodules retain their cutaneous sensibility intact, whereas, according to others, they are completely anaesthetic, the author undertook the investigation of five groups of cases: (1) with the skin affected in purely anaesthetic leprosy; (2) with skin affected in mixed leprosy; (3) with skin affected in severe nodular leprosy; (4) with skin apparently healthy in severe nodular; (5) with skin apparently healthy in mild nodular leprosy. He tested the sensations to touch, to pressure, pain, and to temperature, and examined pathological material by impregnation methods with chloride of gold and nitrate of silver.

Several cases are recorded in some detail in each of the above five groups and the following embody the results: In the first group (4 cases and 11 pathological examinations), in which sensibility was reduced merely to pressure perception, no traces of cutaneous innervation could be made out, even by the special methods employed; in the second (1 case and 3 "biopsies") there was marked reduction of innervation, the nerves being represented by only one apparently healthy fasciculus; in the third (16 cases, 40 biopsies) all gradations

of sensation were found and the changes in the nerves corresponded, varying from almost normal to complete absence, and, in the author's opinion, proportionately. In the fourth group (1 case from which 3 examinations were made), though the skin appeared normal, changes in sensation could be detected and corresponding nerve degenerations were in evidence. In the fifth group, again, there was only one case and no pathological changes were revealed in the nerve supply.

A plate with 12 figures is given illustrating the above points. The paper is interesting and important in its pathological aspects.

H. Harold Scott.

MARCHOUX (E.). **La lèpre de l'homme et la lèpre du rat.**—*Ann. Inst. Pasteur.* 1923. Apr. Vol. 37. No. 4. pp. 342–363. With 1 plate. [3 refs.]

This is a most interesting and complete investigation of a disease mistaken for leprosy in a West Indian patient, who presented rounded brown patches on his face and extremities (but not on the hands or feet), with no alteration of sensation, but with acid resistant bacilli in the skin and nasal mucus, mostly coccoid in appearance. He had febrile reactions after intravenous injections of a soap of cod liver oil, but he developed bullous eruptions and albuminura and left hospital, returning in a dying condition attributed to influenza. A post mortem revealed a streptococcal infection as the cause of death, but the spleen was enlarged and showed innumerable coccial-like acid-fast organisms, which the author named *Mycobacterium pulviforme.* When transmitted to rats by inoculation, it became bacillary in form and undistinguishable from the organism of rat leprosy. The paper is well summed up in the author's following conclusions.

1. An affection occurs in man caused by the development in the tissues of an acid-resistant bacillus differing from the bacillus of Koch and apparently from that of Hansen.
2. This affection differed clinically from leprosy in the case observed in that it produced in its course neither the formation of projecting tubercles nor disturbances of cutaneous sensation.
3. It was characterized by successive series of bullous eruptions followed by the appearance of atonic ulcers and by pigmented scars.
4. It produced a generalized infection which attacked all the organs, apart from the skin and mucosa, and in particular the lymphoid organs, glands and spleen.
5. The pathogenic agent is a small acid-resistant bacillus lying in the tissues in a mass of dust, whence the proposed name of *Mycobacterium pulviforme.*
6. These organisms stain with Gram.
7. They are covered with a thin and fragile film of wax which is impaired with age and often disappears after treatment with xylene. More organisms therefore stain by Gram than by Ziehl's fuchsin.
8. The organisms are intercellular and contained in droplets of lipoid substance which is affected by all grease solvents.
9. This quality renders the study of sections difficult. The enclosing liquids dissolve the binding substance and the organisms escape. Osmic acid is satisfactory for fixing the surrounding lipoid, but gives it such an affinity for stains that the organisms are masked.
10. The multiplication of the microbes seems to be restricted by the leprous cell. As a result the clusters of parasitized cells constitute only microscopic tubercles and never enormous tumefactions as in leprosy.
11. The disease cannot be transmitted to rabbit or guinea-pig, a fact which excludes all comparison with tuberculosis.
12. It can be inoculated into the laboratory-bred rat.

13. In the animal the bacillus loses its pulverulent form, that of resistance and quiescence, and takes the vegetative bacillus form.

14. This bacillus has all the characters of that which causes rat leprosy. It produces the same lesions in the animal.

15. The obviously better adaptation of the germs for life in the organism of the rat than in that of man seems to indicate that the human affection is derived from the rat.

L. R.

MUIR (E.), assisted by LANDEMAN (E.), ROY (T. N.) & SANTRA (I.). **The Spread of Leprosy throughout the Body from Initial Lesions.**—*Indian Jl. Med. Res.* 1923. Vol. 11. No. 1. pp. 239–295. With 29 figs.

This comprehensive paper, which is intended as an introduction to a further communication on treatment, commences by pointing out that the successful treatment of leprosy does not consist merely in injecting the patients with a special drug, but requires individual attention based on clear ideas of the nature and spread of the disease throughout the body. Treatment may not bring about an absolute cure, in the sense that every bacillus in the body is destroyed; but a relative cure may be claimed when, in skin leprosy, repeated examinations fail to show fresh lesions or acid-fast bacilli over a period of two years, and when also in nerve leprosy all progressive nerve lesions (as distinguished from permanent destruction of nerve fibres) have been absent for a similar period. In favourable circumstances the authors "think that there is every hope of a relative cure in the majority of cases, even where the disease has become widespread."

As the older nomenclature does not suffice to describe many early cases of leprosy, they divide the disease into skin and nerve leprosy and mixed leprosy.

The *initial lesion* has been studied in nearly 1,000 early cases in which a history of the first noticed lesion was obtainable, the majority being believed to be the primary lesions, and these are plotted topographically in five diagrams, which show (1) an entire absence from the scalp, probably due to its dense structure or its peculiar blood supply; (2) a preponderance of lesions radiating from the nose as a centre, probably from a nasal infection spreading through the lymphatics of the face; (3) great excess on the extensor surfaces, which is attributed to their being more exposed than the flexor surfaces to insect bites and other injuries liable to be contaminated by scratching; (4) escape of the interscapular region, which also is out of reach of the finger nails; and (5) the excess on the feet, especially the soles, in aboriginal and hillmen, who are especially liable to injury of this part of the body, as compared with dwellers in the alluvial Gangetic plains. All these facts indicate the skin as the site of the entrance of the bacilli, and this inference is supported by the case which they quote of a child of 3 years with a single bacilliferous patch on the cheek, developing after lying on the bed of a leper relative; and that of a boy, who, living for a year in a house recently occupied by an advanced leper, whose mats and carpets had been left, and wearing shorts that exposed his knees to abrasion, developed the primary lesions on the knees. These facts support the widely held view that the lepra bacilli are inoculated through the skin and nasal mucous membrane by excoriations or by scratching.

The *spread from the initial lesion* is next dealt with and the view of UNNA that the bacilli lie in the lymphatics is upheld against that of

HANSEN that they are intracellular, the lymphatic glands also being involved, but without material enlargement, while the periodicity of the disease indicates that the exacerbations are due to metastatic dissemination of the bacilli and setting free of toxins. A diagram is given to illustrate the possible routes of the bacilli (*a*) from the initial lesions through the lymph spaces either of the skin or of the afferent nerve endings inside the sheath of Henle; (*b*) from the initial or subsequent lesions through the blood-stream to all parts of the body, although as a rule they are able to settle and multiply only in the subepithelial tissues of the skin and mucous membrane and in the vascular or fibrous tissues of the nerves, and are destroyed in other tissues, except, rarely, in the lungs (when they appear in characteristic round clumps in the purulent sputum), but these lung lesions clear up under treatment long before those in the skin; and finally (*c*) from primary or subsequent lesions by auto-inoculation.

The *pathology of leprous lesions* is next considered and those of the skin are classed according to the depth to which the bacilli penetrate into (1) infection of the papillary layer just beneath the epithelial layer, which becomes flattened out, causing depigmentation; (2) involvement of the interfollicular layer, causing bulging of the spaces between the hair follicles and resulting in an infiltration of the skin with characteristic narrow linear prominences, well shown in the illustration; and (3) infection of the subfollicular layer, with still greater thickening of the skin and obliteration of the lines of the hair follicles; this may eventually develop into the nodular form, which is thus only an advanced stage of skin leprosy and not really a primary classificatory feature of the disease, as hitherto supposed. The processes of pigmentation and depigmentation in skins of various shades are next described in detail, and the manner in which some cases of skin leprosy develop into mixed or nerve forms is traced. The whole paper is illustrated by numerous excellent photographs of the conditions described in the text, the importance of the recognition of which in relation to treatment being emphasized.

L. R.

WILSON (R. M.). **Treatment of Leprosy.**—*Southern Med. Jl.* 1923. July. Vol. 16. No. 7. pp. 507–509. With 3 text figs. (Discussion pp. 509–511.)

Chaulmoogra oil has been used in a Korea Mission hospital, first orally since 1908, with checking of the disease in many of the 50 per cent. who could take it that way, and since 1913 by intramuscular injections of the oil boiled up with 1 per cent. gum camphor in 3 to 7 or 8 cc. doses weekly into the buttock on Saturdays, with the result that about 8 to 10 per cent. of early cases recover, while probably in 60 per cent. the disease is arrested. Better results were obtained with the whole oil than with ethyl esters, while sodium gynocardate produced no appreciable results. General hygiene including exercise must be attended to, all who are physically fit being given some work, including cultivation. Some cases after four months' injection treatment were able to maintain their health on the oil by the mouth in doses up to 60 minims three times a day, and ten have been paroled as probable cures.

L. R.

LAMOUREUX (A.). **Essais de traitement de la lèpre par des injections intraveineuses et par ingestion d'une émulsion d'huile de chaulmoogra.**—*Bull. Soc. Path. Exot.* 1923. Apr. 11. Vol. 16. No. 4. pp. 227–231.

The author has used STEVENEL's method of intravenous injections of an emulsion of chaulmoogra oil in distilled water after saponifying with normal caustic soda, using 3, 6 or 12 per cent. solutions for injection and up to 25 per cent. orally. Of 10 cases, 6 have been followed up for two to three years, and 4 for a few months only, with amelioration of the condition in all. In those longest under treatment the disease has been maintained in a quiescent state up to two years, but on leaving it off acute exacerbations have occurred.

L. R.

ROGERS (Leonard). **Note on "Defatting" of the Acid-Fast Bacilli of Leprosy and Tubercle by Injections of Chaulmoograte and Morrhuates.**—*Brit. Med. Jl.* 1923. July 7. p. 11. [7 refs.]

In this note Sir Leonard Rogers gives a brief account of the action of the soluble sodium salts of the unsaturated fatty acids of chaulmoogra oil in leprosy, work upon which he has been engaged since 1916. He showed two years ago that the salts, by depriving the lepra bacilli of their fatty envelope, led to the breaking down of the organisms and thus probably to antibody formation followed by clinical improvement.

The *rationale* of the action appears to be that tissue lipolysis is stimulated and blood lipases increased, for in three untreated lepers these lipases averaged an equivalent of only 0·033 of N/10 sodium hydrate, while the average of nine treated cases was 0·22. Further, it has been found that where the lipase content in leprosy is high, a good prognosis is justified, and the same perhaps holds good for tuberculosis, in many cases of which at least the ferment is deficient. The chief interest of this communication lies in the fact that the author by use of chaulmoogra oil derivatives, as recorded by him in 1921, has produced a "defatting" of lepra bacilli *in vivo* analogous to Professor DREYER's results on tubercle bacilli *in vitro*.

H. Harold Scott.

LECLERC (Henri). **Les plantes médicinales des colonies françaises: le Chaulmoogra.**—*Presse Méd.* 1923. June 30. Vol. 31. No. 52. (Supplement.) pp. 1088–1091. With 1 fig. [10 refs.]

In south-eastern Asia, chaulmoogra oil has from time out of mind been a reputed specific for skin diseases and particularly in the treatment of leprosy and elephantiasis. The principal sources of the oil are various species of Bixaceae—*Gynocardia odorata* in Eastern Bengal, *Taraktogenos kurzii* in Burma, and several species of Hydnocarpus (*H. heterophylla, H. anthelminthica, H. serrata, H. subintegra, H. microcarpa*), a genus of wide distribution in India, Indo-China, and Malaysia. The oil resembles olive oil in its physical characters, but has a disagreeable smell, a rancid taste, and a persistent acrid burning aftertaste. That from Taraktogenos and Hydnocarpus contains two acids (chaulmoogric and hydnocarpic), small proportions of palmitic acid and phytosterol, and numerous crystallizable substances; that from Gynocardia contains an acid (gynocardic) which is really a mixture of several acids (linolic, palmitic, linolenic, isolinolenic and oleic), a glucoside (gynocardine) and an enzyme (gynocardase).

Fig. 1.
[1889.]

Fig. 2.
[*Circa* 1898–99.]

Results of prolonged (5 years) treatment with subcutaneous injections of chaulmoogra oil in a case of mixed leprosy. [Case reported by TOURTOULIS Bey.]

In Fig. 1 note the dusky leonine face and heavy dull expression, the wrinkled forehead and sunken bridge of the nose, the thickened lips and lobes of ears, the nodules on the right side of chin, the absence of eyebrows, and in the hands the shrunken interosseous muscles.

[Reproduced from *Annales de Dermatologie et de Syphiligraphie*. 1899. 3rd Ser. Vol. 10.]

Chaulmoogra oil was not used in European practice until 1853, when MOUAT, of the Bengal Medical Service, published accounts [*Indian Annals of Medical Science*, Apr., 1854, p. 646] of three cases of leprosy in which indurated glands had subsided and ulcers had completely healed from its employment as an external dressing concurrently with internal daily doses of 6 to 18 grains of pulped seeds. These results [which were published in the hope that an extended application of chaulmoogra in the treatment of leprosy might "secure the general introduction of the remedy"] were confirmed in succession by YOUNG, of Florence, by James STARTIN, by HILLIS, who gave the oil emulsified in milk, by WINSON and LECLERC, of Réunion, by VIDAL, and by HALLOPEAU, who completely cured a case of nodular leprosy after a three years' course of 200–300 drops daily. ROUX, of Paris, in 1890, wrote a thesis on chaulmoogra oil and gynocardic acid, the action of which in leprosy he compared with that of pot. iod. in syphilis.

In order to obviate the digestive disorders attendant on oral administration, JEANSELME introduced the method of subcutaneous injection, which method in the hands of TOURTOULIS Bey, of Cairo, produced (*circa* 1899) the surprising results exhibited in the accompanying illustrations, showing the effect of 584 injections, amounting in all to 2,720 gm. of oil.

[The more recent history of the use of chaulmoogra may be traced in the pages of this *Bulletin*.]

The discovery of the destructive effects (a hundred times greater than those of phenol) of the fatty acids of oil of chaulmoogra upon bacteria, particularly upon the acid-fast species, has led to further modifications of the chaulmoogra treatment of leprosy (and also to hopes, which as yet have not been realized, of their successful employment in the treatment of tuberculosis). Remarkable improvements in leprous ulcers and in leprous infiltrations of the nasal mucosa have been attributed to Bayer antileprol, which is only a preparation of ethylic ethers of oil of chaulmoogra. But as the preparations of chaulmoogric acid are too irritating for intravenous medication, those of the less active gynocardic acid have lately been recommended, and ROGERS has shown how after intravenous injections of sodium gynocardate the lepra bacilli exhibit signs of degeneration, and leprous lesions are ultimately ameliorated, although the immediate effects may be distressing. No doubt ephemeral improvement must be distinguished from definite cures, but the success of these modern methods of treatment is sufficiently well attested to give confidence that "in the age-long duel between leprosy and therapeutics the latter will soon cease to be the eternal vanquished."

A. Alcock.

CORREA NETTO (Orozimbo). **Novas medicações antileprosas.** [New Treatments for Leprosy.]—*Brazil Medico.* 1923. June 9. Year 37. Vol. 1. No. 23. pp. 315–316.

Among several medicaments spoken of three receive special mention, viz., essence of turpentine, salicylate of sodium, and Linser's mixture.

Of the first a "few drops" are injected into the various nodules, some 5 cc. in all being used. An intense reaction is produced, resulting in the formation of abscesses, and when these clear up the nodules disappear.

Good results are recorded from intravenous administration of sodium salicylate, but details as to dosage are not stated.

Linser's mixture consists of neosalvarsan and corrosive sublimate; this also is given by the intravenous route.

The author incidentally mentions a case of nodular leprosy which cleared up spontaneously after the patient contracted smallpox.

H. Harold Scott.

MATTA (Cagliari). **La terapia bismutica nella lepra.**—*Giorn. Ital. d. Malat. Ven . . d. Pelle.* 1923. May. Year 58. Vol. 64. No. 2. pp. 694–697.

The author used Trepol (a salt of bismuth) in the treatment of seven cases of leprosy, three of the nodular variety, and two each of the anaesthetic and the mixed. The dose employed was 2 cc., equivalent to 20 cgm. of the bismuth, and from 20 to 30 injections in all were administered into the gluteal region, one every third day. After each of the first three or four injections there was some degree of local reaction.

In the nodular forms there was a distinct improvement after seven or eight injections, but the condition appeared to come to a standstill about the 18th to 20th; no further amelioration occurred, and if the injections were discontinued the condition returned to its original state. Perforating ulcers seemed to clear up after 10 to 12 injections, and the blood showed an increase in the erythrocytes from three million to four-and-a-half.

Histological examination was made of a leproma excised before treatment was started and of another at its termination, and comparison showed that the plasma and lepra cells were diminished, connective tissue elements increased and the "granuloma took on more the characters of a fibroma."

The bismuth began to be eliminated in the urine in 16–17 hours and could be detected for 30 days after the course of 30 injections.

The author concludes that though bismuth appears to be distinctly beneficial it cannot be regarded as a specific for leprosy.

H. Harold Scott.

EMBREY (Hartley). **A Feeding Experiment on Two Hundred Lepers at Culion Leper Colony, Philippine Islands.**—*Philippine Jl. Sci.* 1923. Apr. Vol. 22. No. 4. pp. 365–386. With 1 plate. [4 refs.]

This experiment was carried out because the chaulmoogra ethyl ester treatment was not very successful in cases of leprosy complicated with syphilis, yaws or tuberculosis, and the official diet was deficient in calorific value, vitamin content and quantity of protein; fish and fresh vegetables were not regularly available. Proteid was added in the form of mungo bean, *Phaseolus aureus*, which is abundant in the islands and cheap, together with abundant vitamin-containing fresh vegetables and fruit, the new diet containing 98 gm. of protein and a total caloric value of 2,807 for adults. During the 31 days of the trial, of the 200 persons, 82 per cent. gained weight, most marked in persons under 50 years of age; 14·5 per cent. lost weight; while of the early cases 90·7 per cent. gained and the rest were stationary. So the additions to the diet were fully justified.

L. R.

KOLMER (John A.) & DENNEY (Oswald E.). **The Wassermann Reaction in Leprosy with Special Reference to the New Complement-Fixation Technic.**—*Arch. Dermat. & Syph.* 1923. July. Vol. 8. No. 1. pp. 63–72. [30 refs.]

Since EITNER, in 1906, obtained a positive complement-fixation reaction with an extract of a leprous nodule numerous confirmatory reports on the subject have appeared, with varying percentages of positive results, an epitome of which is given. This has led to leprosy, especially the nodular form, being commonly regarded as yielding non-specific positive Wassermann reactions. The writers recently worked out an improved technique of the reaction, which eliminates several sources of fallacy (see *Amer. Jour. Syphilis*, 1922, Vol. 6, pp. 82 and 496), and which they have now applied to 159 leprosy cases with the following instructive results. In 125 lepers, including 31 nodular and 67 mixed cases, without any evidence of syphilis all the Wassermann reactions were negative with the new complement-fixation test, although with the old one, 9 or 11 per cent. were positive ; in 27 lepers with evidence of complicating syphilis the reactions were all positive, and 7 cases with only a suspicion of syphilis were all negative. The authors' conclusions therefore are :—

"1. In a series of 159 cases of leprosy, clinical or serologic evidence of syphilis was found in twenty-seven, or 17 per cent.

"2. In nonsyphilitic lepers, the Wassermann reactions by a new technic were uniformly negative. With an old technic similar to the original Wassermann method, apparently falsely positive reactions occurred with 7·2 per cent. of serums.

"3. In some cases of leprosy, there is an increased tendency of the serum to yield falsely positive Wassermann reactions ; this is especially true in tests employing alcoholic extracts of tissue saturated with cholesterol.

"4. In the new complement-fixation test for syphilis, this tendency is neutralized by the use of a new antigen largely free from anticomplementary activity and other technical improvements.

"5. Since the new complement-fixation reaction does not yield falsely positive reactions in leprosy, it is of value in differential diagnosis between cases simulating both leprosy and syphilis.

"6. A positive reaction in leprosy with the new method justifies the clinician in proceeding with anti-syphilitic treatment without the mental reservation that he may be uselessly subjecting a leper to unnecessary or even harmful measures."

L. R.

GOODPASTURE (Ernest W.). **Complement Fixation in Treated and Untreated Leprosy.**—*Philippine Jl. Sci.* 1923. Apr. Vol. 22. No. 4. pp. 425–437. [9 refs.]

Recently the Philippine Health Service has decreased to six months the retention period of lepers who have become bacteriologically negative, on the ground that even if not cured they are no longer a danger, and has encouraged voluntary admissions for treatment now that chaulmoogra oil preparations have furnished a most promising means of combating leprosy on a large scale. A reliable laboratory method of estimating the degree of cure is much to be desired, and the method here described of attaining this end appears to be hopeful, although requiring confirmation on a larger scale. The large amount of work on the Wassermann test in leprosy has been summarized by COOKE [this *Bulletin*, Vol. 15, p. 274], from 1,397 reported cases

with positive results in 60 per cent. of nodular and mixed forms and 25 per cent. in purely anaesthetic cases, which cannot all be attributed to coincident syphilis.

With HINTON's method in nodular and mixed cases, the writer obtained 60 per cent. positive reactions in untreated lepers, and 84 per cent. in those treated with chaulmoogra oil preparations for a few months who were still bacteriologically positive, but all negative reactions in 16 cases which had become bacteriologically negative under the same treatment. In five positive untreated lepers, six weeks mercury injections produced no change in the strength of the reactions, so they consider the disappearance of a positive reaction in uncomplicated leprosy cases under chaulmoogra treatment to be associated with the diminution of the acid-fast bacilli, but the large number of untreated lepers giving a negative Wassermann makes this test an unsuitable one for estimating the improvement under treatment. They therefore investigated the use of bacterial antigens, of which they found one prepared from the tubercle bacillus by the following method to be the most satisfactory of five organisms tested.

"The organisms were grown on glycerinated broth (in the case of *Bacillus tuberculosis* on glycerinated agar also), the culture suspended in broth, and precipitated by the addition of an equal volume of 95 per cent. alcohol. The precipitate was removed by filtration or by centrifuging, and dried over sulphuric acid. It was weighed and ground in a mortar with sufficient sodium chloride so that, by the addition of distilled water, a 2 per cent. isotonic suspension could be made. The 2 per cent. suspension was shaken thoroughly with glass beads and used as stock antigen. In performing the test a 1 to 10 dilution was used. One cubic centimeter of this dilute antigen was not anti-complementary, and 0·5 cubic centimeter was used as the antigenic dose in each test."

A strain of tubercle bacillus yielding an even milky suspension without flocculi was used, and 24 nodular, mixed, and anaesthetic cases all uniformly gave strongly positive reactions at the beginning of treatment. On the other hand, of 20 nodular and mixed cases, which had become clinically and bacteriologically negative after treatment, only 3 gave complete and 1 more a strongly positive reaction, 14 showed weakly positive, and 2 negative reactions; indicating the test to be of service in measuring the response of patients to treatment.

L. R.

CAPPELLI (J.). **Ricerche sierologiche nella lepra (Comunicazione preventiva).**—*Giorn. Ital. d. Malat. Vener. e d. Pelle.* 1923. May. Year 58. Vol. 64. No. 2. pp. 545–546.

In this preliminary communication the author summarizes his results, the details being reserved for a future paper. The sera of 38 patients were examined, 20 with nodular leprosy, 10 with anaesthetic and 8 with mixed.

They all fixed complement in the presence of syphilitic, leprous or tuberculous antigens, but those of nodular leprosy more powerfully than those from anaesthetic cases. They all contained a natural haemolysin which disappeared in three to six days. Further, the sera, when fresh, had no anti-complementary action; this developed in five to seven days.

Leprous nodules were found to form the best antigens, but extracts of skin of anaesthetic cases and of apparently normal skin of nodular cases were also of service.

The Sachs-Georgi reaction proved positive with very few sera, and this may, therefore, turn out to be a valuable test for distinguishing leprosy from syphilis.

H. Harold Scott.

i. DELAMARE (G.). **Gelure, lèpre nerveuse et ainhum.**—*Rev. Prat. Malad. des Pays Chauds.* 1923. June. pp. 240–259. With 7 text figs. [8 refs.]

ii. MALLANNAH (S.). **An Unusual Infection with** *Bacillus pyocyaneus* **simulating Leprosy.**—*Indian Med. Gaz.* 1923. May. Vol. 58. No. 5. p. 216.

iii. TAMIYA (Sadasuke). [**On the Resistance of the Erythrocytes of Lepers.**] —*Okayama Igakkwai Zasshi* (*Jl. Okayama Med. Soc.*) 1922. Nov. No. 394. [Summarized in *Japan Med. World.* Tokyo. 1923. Mar. 15. Vol. 3. No. 3. p. 52.]

iv. NOC (F.). **Les progrès du traitement de la lèpre.** (**Revue de pathologie exotique.**)—*Rev. d' Hygiene.* 1922. Nov. Vol. 44. No. 11. pp. 955–968. [37 refs.]

i. A minute description of two nerve cases of leprosy, in one of which an ainhum-like condition was present.

ii. A case of *Bacillus pyocyaneus* simulating leprosy and treated as such although no anaesthesia was present ; it cleared up with a vaccine.

iii. Leprous erythrocytes have a high resistance against saponin, especially in the nerve forms of the disease.

iv. This paper gives a general review of the recent literature of the treatment of leprosy without recording any additional facts, and includes a useful list of references.

L. R.

YAWS.

POWELL (Arthur). **Framboesia: History of its Introduction into India; with Personal Observations of over 200 Initial Lesions.**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Dis. & Parasit.). 1923. June. Vol. 16. No. 8. pp. 15–42. With 18 text figs. [42 refs.]

Dr. Powell writes:—

"The history of yaws in India taken alone seems to me sufficient to prove that syphilis and yaws are two distinct diseases.

"Syphilis has existed in India for centuries and is specially prevalent among the coolies recruited from distant parts of India to the tea estates of Assam. In the estates under my care from 7 to 10 per cent. of the population were syphilitic.

"Although prevalent in the Dutch Indies, Malaya and Ceylon, no case of yaws had been observed among the three hundred million inhabitants of British India till in December, 1899 [? 1889], after a residence of one and a half years in Assam, I met my first two cases. From these two the disease spread by direct contact till in ten years I personally observed and treated in a narrow strip of land 22 miles long, by 4 wide, 653 cases in a population of about 6,000.

"In 1887 a coolie woman came from Ceylon with three daughters, the youngest being infected with yaws. The other two girls in turn became infected, and were constant visitors to the lines in which cases were first seen by me. These four women called the disease 'faranghi' while all the other coolies called it 'The New Disease.'"

Afterwards the author lived in Bombay for 19 years. He travelled much, had a large venereal practice, in his capacity of Inspector of Lepers examined many skin conditions, but he saw only one case of yaws, in a pilgrim from Sumatra. He gives details of the spread of the disease in Assam between 1889 and 1900, and later, with a map. Being in charge of indentured coolies and their children he was able to observe his patients at the very appearance of the primary lesion. When the coolies were paraded at roll-call, if a case of yaws had appeared, the native doctor was instructed to register any ulcer, wound, leech-bite or other breach of surface on uninfected men, and these were observed from day to day.

The author has notes of the initial lesion in 205 cases. He has never seen a primary lesion that remotely resembled the ulcers described in the textbooks of BYAM and ARCHIBALD, MANSON-BAHR, and CASTELLANI and CHALMERS. In 43 cases the first sign of the disease was a general eruption in 35–121 days; in seven of these "though no lesion could be seen at the site of presumed inoculation, an ordinary fungating granuloma appeared at a short distance proximal to it; others still more proximal followed in a centrifugal direction till finally a general eruption developed"; three such cases are described. In 162 cases a raised fungating button, identical in all respects with those of the secondary eruption, appeared at the site of the presumed inoculation after 17–68 days. It is carefully described with references to figures. Failing trauma or caustic applications the yaw heals without scar. Ten cases are described illustrating these and other points. Another series illustrates the satellite type, a ring of lesser yaws round the primary. To show the rapidity with which the disease can spread the history is given of a family of seven, six of whom were attacked within three and a half months; vaccination,

a leech-bite and scabies provided the points of entry of the virus. A general enlargement of glands was not observed in uncomplicated cases.

In 11 cases the author took secretion from a granuloma and "vaccinated" the donor; the result was always negative.

Though he has looked carefully for it he has never seen a "prodromal furfuraceous eruption." Children have little fever or joint-ache, adults less than the textbooks seem to indicate.

With the exception of three cases, in two of which yaws was contracted by syphilitic patients, he has never seen any tertiary signs that could possibly be attributed to yaws, but he notes that no patient was under his observation more than 10½ years after inoculation.

Details are given of six cases in which syphilis was inoculated in patients suffering from yaws, and three in which this sequence was reversed. A cracked and pitted form of plantar hyperkeratosis described by CASTELLANI as a sequel of yaws is common in Assam and not rare elsewhere in India: POWELL dissociates it from yaws.

Powell has seen no case of hereditary transmission; on the other hand seventeen babies born of parents who had yaws during pregnancy were healthy and remained so. He refers with much scepticism to the belief that there is no syphilis in Fiji, and notes that 25 years ago there were in that group 10,000 Assamese coolies who, he is unable to believe, were free from syphilis, and inter-racial intercourse is free. [See HARPER, this *Bulletin*, Vol. 10, pp. 265–6.]

The paper is illustrated pictorially and with a wealth of clinical detail.

A. G. B.

SELLARDS (Andrew Watson), GOODPASTURE (Ernest W.) & DE LEON (Walfrido). **i. Investigations concerning Yaws.**
SELLARDS & GOODPASTURE. **iii. Immunity in Yaws.**
SELLARDS. **iv. Public Health Aspects of Yaws.**
GOODPASTURE. **v. The Histology of Healing Yaws.**
SELLARDS & GOODPASTURE. **vi. Summary concerning the Control of Yaws.**—*Philippine Jl. Sci.* 1923. Mar. Vol. 22. No. 3. pp. 219–220. [2 refs.]; 233–250. With 2 plates. [10 refs.]; 251–262. [10 refs.]; 263–284. With 2 plates. [13 refs.]; 285–289. [3 refs.]

i. The opening paper of this series tells us that these studies are based on experience of treatment in the Dominican Republic [see this *Bulletin*, Vol. 20, p. 172] and investigations carried on in the suburbs of Manila [*loc. cit.* p. 175].

iii. The subject of immunity in yaws has, as the authors say, received scant attention. Some observers question the existence of a tertiary stage; the authors are convinced that in many cases the disease terminates spontaneously with the secondary stage and in others lies latent or proceeds to tertiary manifestations; figures, however, are lacking. Late manifestations are variable. Clavus was very common in Santo Domingo but hard to find at Manila. Distinction must be made between sterilizing immunity and latent infection refractory to reinfection.

To resolve these doubts yaws patients were reinoculated during the secondary stage, both untreated and after treatment with neosalvarsan. The material for the first inoculations was secured by removing the yellow crust from a well-developed yaw and scraping the surface

firmly with a scalpel. Smears of the material so obtained contained scanty treponemata. It was reinoculated at once in an incision through the skin, sufficiently deep to cause slight oozing of blood. Observations were made once a week. In the first three cases, of two to five months duration, the result was nil. A group of four patients well advanced in the secondary stage was then similarly inoculated and two weeks later three of these patients were reinoculated in the other arm in two places, a small piece of tissue from a granuloma being implanted. In one of these sites after two weeks there was a round lesion 3 mm. in diameter and 2 in height. A week later the surrounding skin became hyperaemic, but after another week the granuloma was smaller and the hyperaemia was gone. A photograph of this lesion is given. Two cases of clavus with histories of yaws 20 and 13 years before were now inoculated by the implantation method. A week later a papillary eruption was developing in each case but after another week the reactions had almost subsided.

In the second series of experiments small pieces of yaws tissue were implanted in incisions in four cases at the secondary stage, treated with neosalvarsan nearly six months before, and observations were continued for four and a half months. In one patient a typical granuloma developed at the site of inoculation and grew till with the development of early secondary lesions neosalvarsan was given. In the other patients small granulomata developed and in two disappeared spontaneously. Full details are given with the results of the Wassermann reaction, and photographs of the lesions are found. In one instance the lesion was excised and examined ; the appearances were characteristic of yaws.

In view of the favourable results obtained by ALSTON (1911) the serum of patients undergoing salvarsan treatment was given to yaws patients. Neosalvarsan was injected intravenously and serum obtained from the patient's blood several days later. Serum thus obtained from two patients was used in several instances, but without any benefit.

Discussing the reinoculations the authors surmise that their many failures in the untreated cases suggest that the secondary granulomata do not arise readily from accidental transference by the patient to abraded surfaces. They contrast the results with the high percentage of successes obtained by CHARLOUIS (1881). In the treated series only one patient, who had been treated at three months, developed an actively-growing granuloma ; in the others regression was rapid. The authors think that these abortive reactions are due to an active immunity and compare them to the immediate temporary reaction following the vaccination of persons immune to small-pox. Latent infection they think is improbable after neosalvarsan treatment. The results suggest that it is the gradual development of immunity which brings the secondary stage, and often the disease itself, to an end.

Some reflections on cross-immunity in yaws and syphilis are added. The experimental results are conflicting and the authors suggest it would be desirable to demonstrate that some degree of immunity had been established to yaws itself before testing the resistance to syphilis.

iv. The author suggests that the restriction of yaws to warm regions may have to do with the effect of surface temperature upon the development of the granulomata. These show a preference for muco-cutaneous surfaces and regions which are protected by clothing and he instances the observation that in the Mountain Province of Northern Luzon (2,500–5,000 feet), the lesions are largely limited to the mouth, anus and vulva, suggesting that the low temperature inhibits their appearance on the skin.

In many localities yaws may be classed as a disease of childhood: thus at Parañaque 69 per cent. of the cases were in children under 11. To stay the spread it is probably sufficient to treat the primary and secondary stages but on humanitarian grounds and to check the incapacitation caused by tertiary yaws it is imperative to treat latent cases.

He regards a Wassermann outfit as not indispensable, but a valuable adjunct in field work.

As to treatment neosalvarsan stands alone. But "a drug which is efficacious only when injected into the tissues of the body suffers a very real limitation in its general use even in a modern community." Unfortunately, though BROCHARD [this *Bulletin*, Vol. 1, p. 530] obtained good results, salvarsan preparations are not of much value when administered by mouth. Improvement is not rapid enough to render oral administration practicable, and the same objection is raised to tartar emetic by mouth.

The question of the relative advantages of intravenous and intramuscular injection is next taken up. The author found that he could inject two or three times as many patients in a given time intramuscularly and that the therapeutic results were excellent; reaction however was common and sometimes severe. The technique too is simpler. The most serious drawback is the induration at the site of injection. The dosage in field operations was 0·6 gm. for adults, two-thirds of that usually advised. Routine examination of the urine in tropical natives is unnecessary. The comparative cost of the neosalvarsan and the complete iodide and emetic treatment in the Philippines is as 1 : 5.

The author gives the list of articles which form his outfit. He finds that the operation of a dispensary for a single period of a few weeks is altogether inadequate to bring the disease in that area under efficient control; visits are required at intervals of 6 or 12 months.

The available data, largely from the West Indies, show that there is little tendency to recurrence or reinfection after salvarsan treatment.

v. The author says that our understanding of the inflammatory process in the cutaneous lesions of yaws is fairly complete, but it is still undetermined how and where the secondary lesions begin.

In these observations typical early secondary yaws of 1–4 months' duration were removed from four patients before treatment. From one of these a second yaw, as nearly as possible at the same stage, was excised 40 hours after intravenous injection of neosalvarsan. From Case 2 a second and third yaw were excised 3 and 7 days after treatment. From a fifth case a regressing lesion of 4–5 months' duration was removed, and a similar one three days after a neosalvarsan injection.

Sections 1 mm. in thickness were immediately placed in Zenker's fluid and in 10 per cent. formalin. The Zenker material was embedded in paraffin and stained with haematoxylin and eosin; the formalin tissue was stained by Levaditi's silver method.

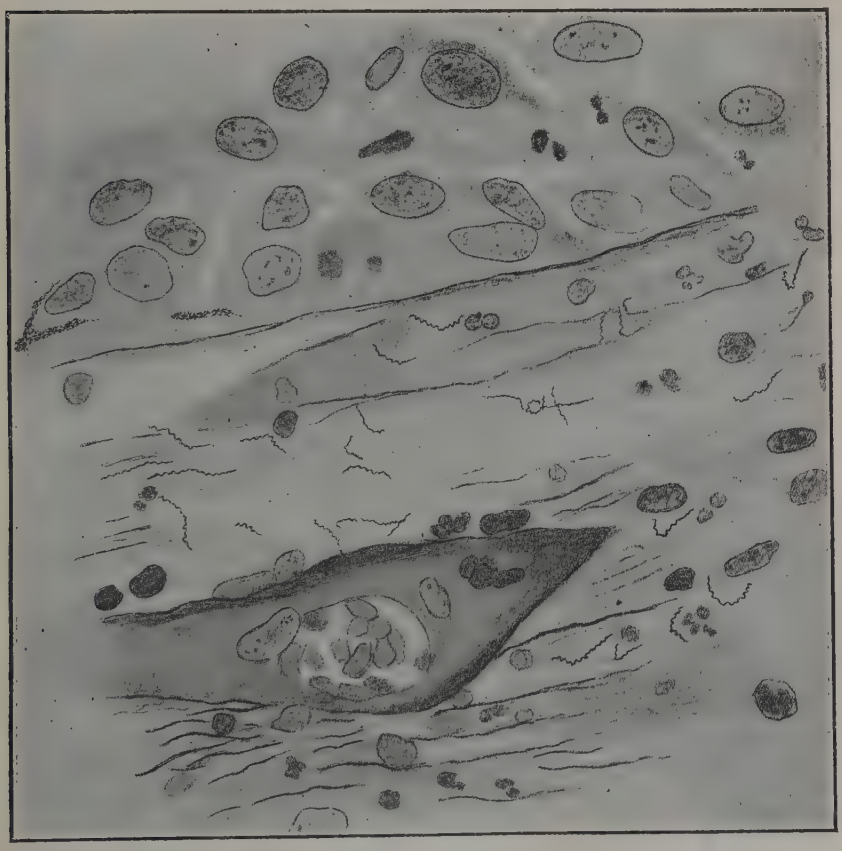
Summary.

"1. *Treponema pertenue* has been demonstrated by Levaditi's method in abundance in early yaws, not only within the thickened epidermis as heretofore observed, but also within perivascular connective tissue of the papillae. [See figure.]

"2. The lesions studied indicate that the secondary yaw begins with a localization of treponemata, from the blood, in certain papillae, and from such points the organisms infect the epidermis, where conditions become more favorable for their growth.

"3. Within forty hours after the injection of a therapeutic dose of neosalvarsan all treponemata demonstrable by Levaditi's method had disappeared from early yaws.

"4. The remarkably rapid healing of secondary cutaneous lesions after injection of neosalvarsan consists essentially in an almost immediate suppression of acute exudation, and the removal of excessive fluid and cellular exudate by surface evaporation, by absorption, and by phagocytosis.



Camera lucida sketch showing treponemata in oedematous connective tissue about vessel in a papilla in early yaws.

[Reproduced from the *Philippine Journal of Science.*]

The thickened epidermis quickly resumes normal differentiation with hyperkeratosis for a while until the epithelial layer becomes again of normal width and rapidity of growth.

"5. It seems probable that neosalvarsan is destructive of polymorphonuclear leucocytes in the lesions, and this may favor the rapid disintegration of treponemata.

"6. The older secondary nodular lesions have a more-permanent architecture, heal less rapidly, and probably offer greater protection to treponemata; consequently, they require more care in effecting a complete cure."

vi. In the closing paper the authors note that while yaws is a loathsome disease its therapy is spectacular. A sufficient degree of immunity is produced. In Santo Domingo the dread of it is pronounced ; infected persons are studiously avoided and by native custom barred absolutely from the villages. Within the home the patient is quarantined in a small outbuilding. No objection was taken to intravenous injection, which was regarded as "magic." The authors find that yaws is "the one outstanding disease of the Tropics through which the immediate confidence and enthusiasm of the people can be secured in public health work." Lastly, efforts in the control of yaws may properly be regarded as a step in the direction of that infinitely more difficult problem, the control of syphilis.

A. G. B.

HUNT (Daniel) & JOHNSON (A. L.). **Yaws, a Study based on over 2,000 Cases treated in American Samoa.**—*U.S. Nav. Med. Bull.* 1923. May. Vol. 18. No. 5. pp. 599–607. With 7 figs.

From the writings of the London Missionary Society the authors conclude that yaws was endemic in the South Sea Islands in 1796 ; the natives date it back to the fifteenth century. In 1921 the cases in American Samoa were estimated from a survey to be 2,500. A campaign of eradication was started and is still in operation, and over 3,000 injections of neoarsphenamine have been given at the hospital and in the villages. The principal agent of transmission is the fly, which breeds chiefly in rotting breadfruits ; it is at these seasons (three a year) that flies are plentiful, and at these times or a little later yaws becomes epidemic ; sores on native children are always covered with flies and white children became infected who lived close to a Samoan village but did not come in contact with natives. They describe the disease partly from their own observations and partly from published accounts. Lesions of the mucous membrane appeared in less than 5 per 1,000 cases, and usually as granulomata of the nasal mucosa. "Snuffles" they found to be common in children during the secondary stage. Painful joints were common and some of the cases might have been taken for rheumatic fever ; these symptoms are alleviated by pot. iod. Nearly 20 per cent. had periostitis on digits, ribs, sternum or long bones ; the authors regard this as a tertiary manifestation. Hyperidrosis was seen in a nurse who six years before received for a secondary eruption 0·6 gm. salvarsan and was now suffering from fissures of the soles ; the symptoms disappeared after 0·9 gm. neoarsphenamine given intravenously. Parenchymatous keratitis was seen, but the authors hesitate to record the diagnosis lest they come to the conclusion that yaws is hereditary ; there is no syphilis. Gangosa, "as it appears in Guam," is never seen in Samoa, but six cases of a lighter form were recorded.

Details are given of the methods used for the control and eradication of yaws. They include the prevention of its introduction from foreign ports, the isolation and treatment of all cases, for which the village chief is held responsible, with inspection of each village twice a month and the destruction of flies and their breeding-places. They find that three intravenous injections of arsphenamine or neoarsphenamine, spread over a period not exceeding three weeks, yield the best results ; 0·9 gm. of neoarsphenamine is the initial dose for an adult.

A. G. B

GOONAWARDENA (J. A. S.). **Parangi in Kolonna.**—*Jl. Ceylon Branch Brit. Med. Assoc.* 1923. Jan.–Apr. Vol. 20. Part 1. pp. 11–17.

Yaws patients are treated in Kolonna hospital of which the author is in charge, but not in the districts. Medical officers, he thinks, should be sent to inject the people in their villages or even homes, and roads should be made to all important villages. Untoward results of intravenous injections given by unskilled persons are quoted, and it is suggested that practice with sterilized saline should come first. The author insists on three injections of salvarsan; most patients who have received only one return, often in a worse condition. Intramuscular injections are quite unsuitable for outdoor work, as the patient is disabled till the next occasion, and moreover he does not wish to submit to a second. The need of sterilization of water and needle does not seem to be always recognized in Ceylon. Like SPITTEL, he considers potassium iodide necessary to complete the cure. One man relapsed after ten injections of salvarsan and he has seen "many similar cases." The iodide should be continued with intermissions for six months.

Yaws will not be eradicated without the co-operation of the villager, and for this his education is essential. The Education Department should in the first place provide for the instruction of the teacher as to what yaws is and how it is spread.

A. G. B.

OHO (O.). **Ueber die Framboesie in Formosa.**—*Trans. 4th Congress Far Eastern Assoc. Trop. Med.* 1921. Vol. 2. pp. 138–148.

The author spent ten years at Taihoku in North Formosa without seeing yaws and then found a focus of the disease in the south-west of the island at nearly 5,000 feet elevation; he saw 13 patients at one village and 39 at another. Most of the infections had started in childhood and many were now 20 years old and affecting chiefly the palms and soles. The lesions are described. A yaw removed from a boy's back showed the usual histological structure. The natives fear the disease and isolate the subjects of it, keeping their eating and drinking apparatus separate and even refusing to send children to a school where a case has occurred, but the disease spreads. The author concludes that it is chiefly disseminated by the numerous flies which settle on the lesions; he observed two species of Musca. The disease is limited to a small area in the mountains. The natives treat it by eating the flesh of the scaly ant-eater, and washing the lesions with its broth; the author suggests that benefit may accrue because their usual diet is one-sided. Salvarsan has the prompt action noted elsewhere and the antimonial antiluetin, given subcutaneously, proved useful; it has the merits of cheapness and painlessness on injection.

A. G. B.

GAVIÃO GONZAGA (A.). **Contribuição para o estudo da bouba no Brazil.** [Yaws in Brazil.]—*Brazil Medico.* 1923. May 5. Year 37. Vol. 1. No. 18. pp. 248–250. With 1 text fig.

The disease exists in various departments, but, as a result of energetic treatment, is becoming rarer. In some rural districts, however, as many as 60 per cent. are affected. In Ceará the Culicoides is believed to be the chief transmitter, as these crowd over yaws lesions and can only be kept away by the lighting of wood fires.

H. Harold Scott.

VAN NITSEN (R.). **A propos d'un cas de pian.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1922. Dec. Vol. 2. No. 2–3. pp. 263–267.

A case of yaws is described in much detail, showing the polymorphism of the eruption and its tendency to localization round the natural orifices; it was present on the mucosa of the lip [see this *Bulletin*, Vol. 18, p. 251]. The initial lesion was on the prepuce—a rare site. In seven patients the large mononuclear and transitional leucocytes numbered between 16 and 39 per cent.; an increase, the author thinks, is the rule. Of 25 cases examined for the Bordet-Wassermann reaction 23 were positive, in some instances 4–5 days after the appearance of the primary lesion: the reaction is found earlier than in syphilis.

A. G. B.

MÜLLER (Armin). **Frambösie und Syphilis.**—*Deut. Med. Woch.* 1923. Mar. 9. Vol. 49. No. 10. pp. 309–311. [6 refs.]

That the spironema of yaws is found in the epidermis, of syphilis in the dermis; that mucous membrane is affected in syphilis but spared in yaws; that congenital transmission occurs in syphilis and not in yaws—these distinctions are regarded by the author as adaptations to climate. Yaws is suited to the tropics; syphilis is independent of climatic conditions. The notion seems to be that in a cold climate instead of the virus being shed from any part of the skin it became mainly restricted to mucous membrane and to compensate for this handicap the spironema became able to infect the ovum.

A. G. B.

GOODMAN (Herman) & TRAUB (Eugene F.). **Frambesiform Syphilid. With Report of a Case.**—*Arch. Dermat. & Syph.* 1923. May. Vol. 7. No. 5. pp. 619–624. With 1 text fig. [8 refs.]

The framboesiform syphilide is an uncommon form of secondary syphilis, which according to PRINGLE is frequently taken for impetigo. It is a nodular syphiloma, which becomes crusted, is an early manifestation, and leads to surprising little scarring after recovery, which under treatment is rapid.

A. G. B.

i. REID (C. B. B.). **Treatment of Yaws by Tartar Emetic. Appendix No. 1.**—*Tanganyika Territory Ann. Med. Report.* 1921. p. 54.
ii. SHIRCORE (J. O.). **Notes on the Treatment of Yaws with Bismutho-sodium and Potassium Tartrate.**—*Ibid.* pp. 57–61.

i. The author treated 182 cases of yaws with intravenous injections of tartar emetic in doses of 1½ grains at 4–7 days' interval, the solution being of strength 24 gr. to the ounce. Mercury and potassium iodide were given by mouth daily. Of 178 all were discharged free from symptoms after an average stay in hospital of 35 days and an average of 7 injections: 42 have reported periodically for 2–9 months and have remained well. The author thinks that tartar emetic is a valuable adjunct to mercury and iodide, though its action is not to be compared with that of salvarsan.

ii. Mr. MCGOWAN at the instance of Shircore produced a sample of bismutho-potassium sodium tartrate from bismuth oxide. Shircore tested it on himself without ill effect, and subsequently on a yaws

patient with promising results. More was then prepared but the composition was evidently different and larger doses were needed. Dr. PARRY reports on its use in yaws and syphilis, 42 patients in all. The drug was given intravenously at five days' intervals, the optimum dose being 5–6 grains. He considers that its action is as good as that of salvarsan. It was equally beneficial in the secondary stage of yaws and late manifestations of yaws and syphilis. Of 14 patients treated in hospital the average stay was 13 days, the number of injections 1·8, average amount 9·2 gr. Nine cases of tertiary yaws and syphilis had to be detained 41 days. A standard method of preparation is needed. Spirillum fever in one instance was apparently cut short by the drug.

A. G. B.

GRENADA. **Reports on Intensive Treatment of Yaws in Grenada, (i) for Half Year ended 30th June 1922, and (ii) for Half Year ended 31st December 1922.** [PATERSON (G. W.), Colonial Surgeon.] [M.S. received from the Colonial Office.]

i. The yaws campaign began in May, 1919, so that figures are now available for more than three years. In this period 11,904 patients were injected out of a population of 66,000, but possibly some of the cases figure more than once. The number of tubes of novarsenobillon used was 26,464 and the total expenditure on drugs and injection apparatus £6,617 4*s*. 3*d*. 10,531 cases had been discharged as cured. The statistics show also that the average cost of cases discharged cured has fallen from 19*s*. 11½*d*. in the period prior to December, 1920, to 12*s*. 6½*d*. for the whole period to date.

ii. The second report carries on the story another six months, during which 1,081 cases were seen; 11,656 cases had been discharged cured, and of 1,314 unaccounted for it was presumed that all had recovered. The average cost of treatment had been reduced to just below 12*s*. That the number of cases does not diminish is explained by the fact that old non-infective cases are now presenting themselves; of one district it is said, "Nearly the whole number is made up of old ulcers, and the condition on the sole of the feet known as 'crab.'" Dr. PATERSON reports that owing to the cheaper cost of neosalvarsan (German) as compared with novarsenobillon he has recently employed it but has decided to return to novarsenobillon as the neosalvarsan tends to give rise to abscess formation and is less effective.

A. G. B.

GOODPASTURE (Ernest W.) & DE LEON (Walfrido). **The Effect of Treatment on the Wassermann Reaction in Yaws.**—*Philippine Jl. Sci.* 1923. Mar. Vol. 22. No. 3. pp. 221–231. [8 refs.]

The authors state that since a positive Wassermann reaction is obtained in a large proportion of cases of leprosy free of syphilis and has been often reported in malaria, such positive reactions cannot have the same diagnostic significance in the tropics as in the temperate zone. Like other observers, they have found a positive reaction constantly in yaws, which is very confusing from the standpoint of differential diagnosis. The reaction, however, should be used to establish the efficacy of any treatment of yaws; although in practice it is not necessary to continue treatment until a negative reaction be obtained, yet no case can be regarded as completely cured until that

negative reaction is obtained. The reaction is of value in the recognition of latent yaws and in the differentiation of "tropical ulcers" that may be benefited by neosalvarsan from those that have no relation to either syphilis or yaws.

"1. The Wassermann test was strongly positive in 100 per cent. of 45 patients presenting active cutaneous lesions of yaws.

"2. Complement-binding strength of titrated serum from yaws is equal to the maximum strength of syphilitic serum.

"3. Following the clinical cure of yaws by intravenous injection of neosalvarsan, the Wassermann reaction remained positive for many months, gradually weakened and became negative in 7 of 12 cases within six months after treatment.

"4. Treatment of yaws, in the early secondary stage, with mercury caused no noticeable improvement in the lesions. The Wassermann reaction showed an initial slight weakening in the titre, then remained constant and strongly positive.

"5. An antigen prepared from an early yaw containing treponemata did not fix complement with sera from yaws patients that were strongly positive with the usual cholesterinized antigen."

The authors used mostly an antigen extract of cholesterinized alcoholic extract of guinea-pig's heart. In a few tests the extract was made from ox heart.

The tests were controlled by normal and syphilitic sera.

H. M. Hanschell.

MISCELLANEOUS.

CAWSTON (F. G.). **The Antimony Treatment in some Tropical Diseases.**—*S. African Med. Rec.* 1922. July 8. Vol. 20. No. 13. pp. 245–248.

This paper, read before the South African Medical Congress, 1921, deals with treatment by antimony in bilharziasis, syphilis, leprosy, and hydatid cyst; it contains little not previously published.

Antimony has been used in the treatment of fluke-infested sheep and is suggested for infection by *Paragonimus westermanii* and taenia.

For syphilis, ½ to 2 gr. of tartar emetic are given daily intravenously, freshly dissolved in 3 cc. of boiling saline. The total cost of three weeks' treatment is one penny per patient. Illustrative cases are given. Colloidal sulphur was in some instances given as well

A. G. B.

LEVY (M. D.) & DIMMITT (Pauline S.). **A Note on the Effect of Tartar Emetic Intravenously on the Non-Protein Nitrogen of the Blood.**—*Amer. Jl. Trop. Med.* Baltimore. 1922. Nov. Vol. 2. No. 6. pp. 569–572. [10 refs.]

Six cases from the medical wards after complete blood analyses received tartar emetic intravenously in 2 per cent. solution, six doses of 0·5–5 cc. In three instances the non-protein nitrogen was increased from 75, 33 and 33 mgm. per 100 cc. to 120, 50 and 50. In the first instance albuminuria was noted. The analyses are given in tables, before and after treatment.

A. G. B.

CHOPRA (R. N.) & NAPIER (L. E.). **The Therapeutics of Antimony.**—*Indian Med. Gaz.* 1923. Jan. Vol. 58. No. 1. pp. 1–7. With 6 graphs. [15 refs.]

This paper is mainly a summary of the therapeutic uses of the salts of antimony and the methods of administration. The original matter consists in a description of the results of injection of potassium antimony tartrate, sodium antimony tartrate, stibacetin and stibamine into the thigh muscles of rabbits. The degree of oedema, necrosis and haemorrhage are compared in each case and it was found that the severity decreased in the order given above. The effect of potassium and sodium antimony tartrate on the heart, blood pressure and respiration is shown in a series of graphs. When the drugs are injected slowly, as is done clinically, there is little change, but when done suddenly there is a very marked and sudden fall in the blood pressure. In the isolated rabbit's heart a depression is noted. The sodium and potassium salts and stibenyl produce similar results.

C. M. Wenyon.

DUTT (Madan Mohan). **Studies on Quinine.**—*Calcutta Med. Jl.* 1922. Nov. Vol. 17. No. 5. pp. 201–231.

Among the studies here recorded we may take note of some simple experiments on the effects of dilute solutions of several salts of quinine on amoebae and paramoecia.

They show that in solutions of 1 in 2,000 quinine hydrochloride is much more toxic, though in weaker solutions (1 in 10,000 and upwards) not more toxic, than quinine bihydrochloride ; (2) that in solutions of 1 in 2,000 to 1 in 20,000 the bihydrochloride is decidedly more toxic, though in solutions of 1 in 40,000 only a little more toxic, than quinine sulphate ; (3) that in solutions of 1 in 40,000 the sulphate is decidedly more toxic, though in weaker solutions not so very much more toxic, than the bisulphate ; (4) that in all dilutions (1 in 2,000 to 1 in 40,000) the bisulphate is, for amoebae, more toxic than the hydrobromate, and the hydrobromate than the bihydrobromate ; and (5) that even in dilutions of 1 in 2,000 quinine tannate has no effect, or very little. Some further experiments show that the most toxic of these quinine salts—the hydrochloride—in dilutions of 1 in 6,500 and 1 in 40,000 is to paramoecia very much less toxic than corresponding dilutions of arsenic. [These experiments do not appear to take cognizance of ACTON's experiments (this *Bulletin*, Vol. 19, p. 103), showing that the amount of a cinchona alkaloid necessary to kill paramoecia is very considerably determined by the hydrogen-ion concentration of the medium.]

A. Alcock.

BARNES (Milford E.). **Intolerance of Quinine. A Case Report.**—*Jl. Trop. Med. & Hyg.* 1922. Aug. 1. Vol. 25. No. 15. pp. 246–248.

On four different occasions, three of them under daily observation, the ingestion of the bisulphate or bihydrochloride of quinine produced vesicular dermatitis of the toes, fingers and scrotum of a Chinaman, accompanied by intense itching, and followed by desquamation. Purpura also occurred. The infection was with *Plasmodium vivax*. During an apyretic interval, the man being upon Fowler's solution, he also received 1 gr. of quinine sulphate in divided doses during the 24 hours, the amount being gradually increased until he was taking 2 gr. daily with no untoward effects. Quinine was then dropped for a month, after which 10 gr. daily for two days produced no inconvenience. Yet when quinine was given two months later during a malarial attack the discomfort was as great as ever. The state of blood coagulability is not mentioned.

Clayton Lane.

i. FIGDOR (Philip) ; PINNOCK (D. Denham). ii. BRODRIBB (C.). **Quinine Necrosis of Muscle.** [Memoranda.]—*Brit. Med. Jl.* 1922. July 1 & 15. p. 14 ; p. 109.

i. The patient contracted malaria in Salonika in 1916, when he had "about 49" injections of quinine into each buttock alternately every other day. Later he noticed at first several swellings, then one "big lump," which was the condition when he was seen in 1921 by the authors. There was then a cigar-shaped swelling some 3 in. long in the right buttock, which moved freely and caused discomfort. It was therefore cut down on. An adventitious bursal sac in the upper part of the gluteus muscle was opened in which a greyish-white cigar-shaped body lay quite free. Examination proved it to consist of necrosed muscle fibre, and it is suggested that the necrosis was owing to the direct action of quinine and to pressure of the injected fluid in the muscle bundle cutting off its blood supply. The specimen is in the Museum of the Royal College of Surgeons.

ii. Major Brodribb suggests that quinine necrosis will not occur if the injections are dilute. He uses 5 gr. in 10 cc. of diluent both for intramuscular and intravenous injections, and, with an extensive experience, has seen no ill effects.

A. G. B.

LEVADITI (C.) & NICOLAU (S.). **Vaccine et néoplasmes.**—*C. R. Acad. Sci.* 1922. June 19. Vol. 174. No. 25. pp. 1649–1652.

Some of the work of Levaditi and his collaborators on a group of filterable viruses (" ultra-viruses ") having an affinity for tissues derived from the the ectoderm has already been noticed in this *Bulletin* [Vol. 19, p. 618; Vol. 20, p. 7]. In the present paper are recorded the results of some experiments undertaken to determine the relations between neurovaccine (an " epitheliotropic " virus adaptively " neurotropic ") and cancers and sarcomas experimentally produced in rats and mice. These experiments confirm the conclusion that neurovaccine (vaccinia virus) has a natural affinity for epithelial and germinal cells and no affinity for tissues derived from the mesoderm, and they also carry the inference that the cells of a neoplasm have vital aptitudes of their own apart from the tissues of the host. The following is a summary of the results of these experiments.

1. When neurovaccine is injected into a well-developed epithelial tumour the tumour increases in size and produces an abundant culture of the virus ; but when it is injected into a sarcoma it not only does not " take " but it is also either completely destroyed or grows badly. The same things happen when the neurovaccine is injected, not into the tumour direct, but into the blood of the affected animal.

2. The vaccinated epithelial tumour usually loses its power of striking when grafted into new animals ; rarely a graft does grow, and continues receptive to the vaccinal virus.

3. When a graft from an epithelioma is implanted into a rat that has already been vaccinated by inoculation into the skin the graft grows into a tumour, but the tumour is immune to vaccinia virus, though grafts taken from it are found soon to regain their receptivity ; that is to say the neoplasm developed in the already immunized animal borrows immunity only so long as it remains in actual continuity with that animal.

4. On the other hand an epithelioma developing in an ordinary (unimmunized) rat and then thoroughly inoculated with vaccinal virus is found to be quite susceptible to fresh inoculation 30 days afterwards—an interval long enough for acquisition of immunity by intracutaneous vaccination.

A. A.

JANCOU (A.). **Vaccination de l'Homme par la Neurovaccine.**—*C. R. Soc. Biol.* 1922. May 6. Vol. 86. No. 16. pp. 910–911. [2 refs.]

The neurovaccine (of LEVADITI & NICOLAU) is vaccinia virus cultivated in the brain of the rabbit. Its particular recommendation is said to be complete freedom from any complicating organisms ; if, as occasionally may happen, it does cause local oedema and inflammation, this is to be explained as an idiosyncrasy. In 30 vaccinations of new-born infants the author obtained a positive result in 70 per cent. ; and in 289 adults, most of whom had been vaccinated at some time previously, a positive result was obtained in 37 per cent.

A. A.

MACCALLUM (W. G.) & OPPENHEIMER (Ella Hutzler). **Differential Centrifugalization : A Method for the Study of Filtrable Viruses, as applied to Vaccinia.**—*Jl. Amer. Med. Assoc.* 1922. Feb. 11. Vol. 78. No. 6. pp. 410–411.

By centrifugation the authors have been able to separate from vaccinia lymph myriads of minute granules, very much smaller than streptococci

or staphylococci, which apparently are identical with the granules seen in tissues and smears from vaccinia and smallpox by PROWAZEK, PASCHEN, HALLENBERGER and others.

The lymph operated on was a viscid turbid fluid containing 2·34 per cent. of glycerine and having a sp. gr. 1·638. Centrifugated at high speed for an hour it separated into a solid sediment, a thick turbid layer, and a superficial less turbid layer. Corneal inoculation (rabbit) from the top layer alone produced a typical vaccine lesion.

The top layer was drawn off into a very narrow test-tube and made up to 1 cc. with Locke's solution. The mixture, sp. gr. (at 24° C.) 0·99, was centrifugated and inoculated as before: the infective virus was now found in the bottom layer; its specific gravity therefore lies between 0·99 and 1·638. By a series of experiments it was found that the virus floats in a suspending fluid of sp. gr. 1·14 and sinks in one of sp. gr. 1·11; its own specific gravity therefore is probably about 1·12 or 1·13.

When the virus is washed and centrifugated in a suspending fluid just heavier than itself, in the resulting (virulent) top-layer the granules will be disclosed by dark-field illumination. They shine dully, and show movement probably Brownian. They occur singly, or in small groups, or sometimes in tiny beaded chains. They can be seen under an ordinary microscope, and, when clumped, with a low power. They stain faintly with Löffler's blue, show blue or red with Wright's stain, and take a fairly deep stain with carbol fuchsin; they are Gram-negative, and they do not stain with neutral red or trypan blue. The authors have not got them to agglutinate, nor as yet have they attempted culture.

What the authors wish to emphasize is the method of differential centrifugation with the use of suspending fluids of different specific gravities—a method full of widely suggestive applications.

A. A.

REYNÈS. **Les greffes sur les noirs.**—*Congrès de la Santé Publique et de la Prévoyance Sociale, Marseille, 11–17 Septembre 1922. Comptes Rendus.* pp. 235–236.

On three Senegalese with large ulcers on the legs and feet the author practised grafting with strips obtained from the thigh. They took well but grew white, losing all their pigmentation. The decoloration is explained by the process of vitalization of the graft—new vascular connexions, action of leucocytes, etc. The author does not know whether pigment appeared later.

A. G. B.

i. MATIGNON (J. J.). **Les stations thermales françaises pour coloniaux.**—*Congrès de la Santé Publique et de la Prévoyance Sociale, Marseille, 11–17 Septembre 1922. Comptes Rendus.* pp. 316–328.

ii. ROUZAUD, BISCONS & DE FOSSEY (Mathieu). **Vichy et les Coloniaux. (Indications et contre indications).**—*Ibid.* pp. 329–334.

i. The properties of five French spas are here described with much detail:—(1) Châtel-Guyon, to which the author is attached, (2) Plombières, (3) Brides-les-Bains, (4) La Bourboule, (5) Royat. The author classifies the states for which tropical residents are invalided, as gastro-intestinal (parasitic or toxi-alimentary), hepatic (malarial or toxi-intestinal), and blood states (various forms of anaemia), with reservations as to the sharpness of these distinctions. For affections of the digestive tube (1), (2) and (3) are advised; for liver cases, Vichy and (4); for anaemia, (4); for recruitment of health, (5). La Bourboule water is rich in arsenic. For details of the waters, their uses, and the states which benefit in each case the paper must be consulted.

ii. Similar details are given for Vichy.

A. G. B.

VERVOORT (H.). **Verslag van het pathologisch laboratorium Medan-Deli (Sumatra's oostkust) over 1907-1921,** [Report on the Pathological Laboratory at Medan (Province of Deli, Government of Sumatra's East-coast) from 1907 to 1921.]—60 pp. With 1 map & 7 figs. [57 refs.] 1922. Medan: Typ. Köhler & Co.

This laboratory, founded in 1907 by three tobacco-growing companies, to provide for themselves a central institute for investigations that cannot be carried out at the ordinary hospital laboratories, quickly became a research-centre for the whole of Deli and its adjoining provinces under the able directorship of Dr. W. A. KUENEN and his temporary or permanent successors, VAN LOGHEM, VERVOORT and SNIJDERS. In 1920 the institute came into the joint possession of the Deli Planters' Association and the Union of Rubbergrowers on Sumatra's East-coast.

Apart from a list of the directors, assistants, workers and visitors, the report gives a summary (pp. 10–50) of (1) Clinical bacteriological examinations carried out in this period, with some details of the bacteriological diagnosis of cholera, pseudocholera, typhoid and allied diseases, amoebic and bacillary dysentery, plague, etc.; (2) Clinical microscopical examinations (malaria, filariasis, etc.); (3) Bacteriological and chemical surveys of existing or projected local water supplies; (4) Veterinary examinations (rabies, surra, anthrax, etc.); (5) Preparation of diagnostic sera; 22 kinds are in use but only typhoid-paratyphoid serum is prepared on a large scale for export (16,925 cc. in 1921 with 18,160 cc. emulsion for Widal-test); (6) Chemical examinations (notably on the quality of rice); (7) Wassermann-tests, the technique used being described in detail (55,854 examinations since 1912).

On pp. 50–55 are some details of the preparation and distribution of vaccine lymph (33,049 doses in 1921); polyvalent vaccines against cholera (30,270); typhoid (38,175); combined cholera-typhoid (6,481); cholera-typhoid-paratyphoid A (2,225); typhoid-paratyphoid A (19,500); staphylococci (3,090); gonococci (3,960); meningococci (705 doses in 1920); various autovaccines in smaller quantities; therapeutic or prophylactic sera against Shiga-dysentery (17,610 cc. in 1921) and epidemic meningitis (8,600).

A record of post-mortem examinations and of original researches, together with a list of publications referring to the latter, is appended.

N. H. Swellengrebel.

LE DANTEC. **L'Institut d'Hygiène Sociale de Dakar.**—*Congrès de la Santé Publique et de la Prévoyance Sociale, Marseille, 11–17 Septembre 1922. Comptes Rendus.* pp. 398–403.

The Institute of Social Hygiene at Dakar comprises dispensaries for general diseases, tuberculosis, venereal diseases, special subjects (eyes, ears, etc.), skin diseases, gynaecology, each with its own Medical Director, and prenatal and babies' departments presided over by midwives—all European personnel. Some of these had precursors—in 1921 there were no fewer than 10,000 women patients—but the opening of the Institute took place in June, 1922. The success may be gauged by the fact that in July 1,522 persons came for advice. Adequate records are filed. There are four nurse visitors who attend the women's departments in the morning and go their rounds afterwards. [See also this *Bulletin*, Vol. 17, p. 218.]

A. G. B.

VALENZUELA (A. J.). [**Breve resumen sobre la patología médica ecuatoriana y su distribución geográfica.**]—*Anales de la Soc. Méd.-Quirúrgica del Guayas.* 1922. No. 14. [Summarized in *Arch. f. Schiffs- u. Trop.-Hyg.* 1923. Apr. Vol. 27. No. 3. pp. 109–110.]

From the German summary the following is gleaned :—

Diseases found in Ecuador are: tuberculosis, syphilis, leprosy, smallpox, measles, malaria (68 per cent. of hospital admissions), typhoid, bacillary and amoebic dysentery, gonorrhoea, influenza, yaws, plague (Guayaquil), cerebrospinal meningitis, trachoma, anthrax, pneumonia (especially in the mountains), sprue, pellagra, beriberi. The usual intestinal parasites are found. Filaria has not yet been microscopically demonstrated. Scarlet fever is sporadic, blackwater fever rare. Cholera, typhus and undulant fever have not been reported, rabies only once. Diphtheria is sporadic and mild. Kala azar has not yet been diagnosed but dermal leishmaniasis is widespread.

A. G. B.

DUBOIS (A.). **Syphilides secondaires localisées aux tatouages.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1922. Dec. Vol. 2. No. 2–3. p. 153. With 1 plate.

A woman in whom a chancre was diagnosed returned later with a papulo-squamous eruption limited to old tattoo marks on the arms, abdomen and hips. Each little keloid was surrounded by a syphilide and there were no lesions elsewhere.

A. G. B.

LOUGHNAN (W. F. M.). **Notes on Alastrim in Jamaica.**—*Jl. Roy. Army Med. Corps.* 1922. Nov. Vol. 39. No. 5. pp. 378–381. [6 refs.]

An account of the history, etiology, method of spread, and symptoms of alastrim, as seen in Jamaica. It does not seem to add anything of importance to the accounts noticed in this *Bulletin* (Vol. 19, p. 438). A table of the differential diagnosis of smallpox, alastrim and varicella is given from COPEMAN.

A. G. B.

MOFFAT (R. U.). **Amaas or Alastrim.** [Correspondence.]—*Brit. Med. Jl.* 1922. Aug. 12. p. 283.

The writer, in opposition to DE KORTE, maintains his belief that "amaas" and "alastrim" are synonyms of smallpox. He thinks that the assertion that amaas has been endemic under that name for centuries overlooks the fact that our knowledge of South Africa beyond the boundaries of Cape Colony, and of South African diseases, is comparatively recent. He attributes the origin of the term "Kaffir pox" and of the reputed immunity of Europeans, to a well-meant attempt, during the Kimberley epidemic of 1881, to avert a scare among Europeans. He admits that Europeans do not usually contract smallpox from South African natives, but only because Europeans are usually protected by vaccination.

A. A.

i. DE KORTE (W. E.). **Small-Pox and Amaas.** [Correspondence.]—*Lancet.* 1923. Jan. 13. p. 101.
ii. ROBERTSON (Wm.). **Small-Pox and Amaas in South Africa.** [Correspondence.]—*Ibid.* Jan. 27. p. 205.
iii. WALKER (P. H.). **Small-Pox and Amaas.** [Correspondence.]—*Ibid.* Mar. 17. p. 564.

Three letters from South Africa :—

i. In the present state of knowledge, that is with the etiological agent unknown, no one can affirm what is the relationship between smallpox and amaas. The death-rate of amaas is low and Jennerian vaccination is preventive. It is still, however, uncertain whether amaas breeds true to type, though it seems to do so. As long as the identity is uncertain, the name amaas should be kept up. The author's own view is that it is mitigated smallpox.

ii. Memories of the Kimberley smallpox outbreak of 1882, which the author stamped out by vaccination.

iii. Walker thinks that the relation of amaas to smallpox is that of scarlatina to scarlet fever, and believes that "it only requires passage through a sufficient number of adults to convert what is now a child's mild disease into the terror of pre-vaccination times."

A. G. B.

HOFFMANN (W. H.). **Das Blutbild als klinisches Untersuchungsmittel.**—*Deut. Med. Woch.* 1922. Vol. 48. No. 27. pp. 903–904.

A discussion on the time necessary for making a reliable differential count of 100–200 leucocytes. SCHILLING and his colleagues allow 5 to 10 minutes; Hoffmann, after 20 years' experience in the tropics, maintains that it cannot be done in less than 10 to 20 minutes and sometimes may require 30 to 50 minutes.

A. A.

ATMOSOEDIRO (Mas Iskandar). **The Bilirubin-Content of the Blood.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1922. Pt. 4. pp. 280–293.

The author has investigated by MEULENGRACHT's colour-reaction test the bilirubin content of the blood in Weltevreden—in normal persons, in whom it does not differ from the European standard, and in various diseases. He finds that the determination of the bilirubin content is of practical clinical value in the following cases: (*a*) when the amount of bilirubin in the blood rises during or shortly after attacks of pain suggesting biliary colic, gallstone or, rather, disturbance in the excretion of bile is indicated; (*b*) in icteric cases a fall from 50 to 30 is a good prognostic; (*c*) in secondary anaemia—the amount of bilirubin is always low; (*d*) in the early stages of broken compensation of the heart the amount of bilirubin is always raised; (*e*) in differential diagnosis in fevers a raised bilirubin figure points to pneumonia.

A. A.

DJAMIL (Moh.). **The Secretion of Chlorine in Febrile Diseases.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1922. Pt. 4. pp. 226–235. With 12 charts. [10 refs.]

The author has investigated the secretion of chlorine in different febrile diseases in Weltevreden—malaria, pneumonia, typhoid,

epidemic meningitis, van der Scheer's fever, and dysenteries—also in oedema, and he finds no great differences from observations made in Europe, except in the case of malaria. In Europe an increased secretion of chlorine, in the tropics a reduced secretion, has been observed during malarial fever, but the author thinks that this difference is attributable to the period of observation and the amount of material examined.

A. A.

KORTHOFF (G.). **Investigation into the Relation of the Four Groups for Bloodtransfusion in the Dutch East Indies.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1922. Pt. 4. pp. 193–199.

The author sketches the history of transfusion of blood up to Moss, who in 1910 in his "Studies on iso-agglutinins and iso-haemolysins" formulated the inter-relations of human bloods within four distinct groups. For practical purposes of transfusion the author has studied European and Native bloods in Java. He finds that they can be classified, according to the Moss formula, in four groups having the same inter-relations as in Europe and America, but that within each specific group slight variations in the degree of agglutination and haemolysis exist. He recommends that the examination of individuals for suitability of transfusion should be made microscopically, with not too small quantities of blood; and he considers that very slight degrees of agglutination need not invalidate a donor.

A. A.

PEREIRA LAGE (Fausto). **Influencia da seca em Cabo Verde na patologia Indígena. Doenças por "carencia" (avitaminoses).** [Drought as a Disease Factor in Cabo Verde. Deficiency Diseases.]—*Rev. Méd. Angola.* 1922. Sept. No. 3. pp. 143–145.

The author records eight cases of beriberi and one of pellagra. These are attributed to a severe drought for two successive years which led to failure of vegetable crops and to deterioration of the cattle used for food, so that the inhabitants were forced to exist largely on maize, often of inferior quality. All the patients were children, only one being over seven years of age.

H. Harold Scott.

HOOTON (A.). **Ether in the Tropics: A Further Note.**—*Indian Med. Gaz.* 1922. Dec. Vol. 57. No. 12. pp. 455–456.

The author described and recommended some months ago Dr. K. B. PINSON's ether vaporizing apparatus as particularly adapted for use in the tropics. PINSON has now employed it in about 5,000 cases [where, is not stated] with unqualified success. The consumption works out at 4–7 oz. per hour of maintenance, anaesthesia having been induced by other means. He agrees that cheap methylated ether is as good as "anaesthetic" ether and recommends both McFarlane's and Howards'.

A. G. B.

MÜLLER (Reiner). **Aloys Pollender 1800–1879.**—*Jahrbuch des Bergischen Geschichtsvereins.* Elberfeld. 1922. 9 pp.

Some particulars of the parentage and life of Dr. Aloys POLLENDER, who was the first to discover the organism subsequently classed as

Bacillus anthracis, in the blood of cows dead of splenic fever. POLLENDER's discovery was made in 1849, but was not disseminated until 1855, in Caspar's Vierteljahrschrift, VIII. POLLENDER discovered the organisms, described them, and recognized that they must belong to the vegetable kingdom ; but he did not investigate their significance —whether they were causative, or determinative, or merely concomitant in relation to the disease, though he understood that these questions required investigation.

[Textbooks of Pathology mention the name of POLLENDER and the date of his discovery of the organism ; but, unlike the present author, they do not attribute the discovery of pathogenic bacilli to POLLENDER.]

A. A.

MONTEIRO (J. Lemos). **Sobre o phenomeno de d'Herelle. Presença do principio lytico nas culturas em meio solido, do** *Bacillo anthracis, B. pestis* **e** *B. dys.* **Shiga-Kruse.**—*Brazil-Medico.* 1922. June 10. Year 36. Vol. 1. No. 23. pp. 297–301 ; and *Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1922. May & June. Vol. 5. 2nd Ser. Nos. 3 & 4. pp. 71–78.

A highly technical account given before the " Sociedade de Medicina e Cirurgia de S. Paulo " on June 1, 1922, of experiments on the subject of bacteriolysis occurring in gelatine cultures of the named micro-organisms. The author's conclusions are stated as follows :—

1. In old gelatine cultures (inclined) of *B. anthracis, B. pestis* and *B. dysenteriae* (Shiga-Kruse type) a bacteriolytic principle is met with capable of dissolving the respective bacilli.

2. This principle manifests its action in series. Its activity is, however, not very marked.

3. It is probable that its increase proceeds in definite proportion to its formation at the expense of the bacteria dissolved.

4. The bacteriolytic principle (lysin) secreted by the micro-organism in culture brings about the phenomenon of lysis in a manner different from that of the bacteriophage of d'Herelle.

5. The lysin secreted by bacilli, not in culture but in a resisting animal organism, is very much more active, its activity being not merely maintained but augmented in successive series in proportion to its formation at the expense of fresh bacteria dissolved.

F. S. Arnold.

DAY (H. B.). **A Note on the Effect of Bismuth on the Kidneys.**—*Lancet.* 1922. Aug. 12. pp. 328–329. With 2 charts in text.

Several observers have testified to the curative action of bismuth in spirochaetous diseases. It is also known that soluble compounds of bismuth are at least ten times more toxic when given by the intravenous than by the intramuscular method.

The author has experimented with intravenous injections of liquor bismuthi et ammonii citratis (B.P.) properly sterilized, and has observed that a large dose (2 cc.) provokes signs of poisoning—nausea or actual vomiting and slight diarrhoea and also a copious diuresis not accompanied by any signs of vesical irritation. In one case a single intravenous injection of 2 cc. was followed by an acute tubular nephritis.

To determine the possibility of a diuretic effect of the citrate component the same amount of citrate of potash was given intravenously to several patients; this had a distinct but far less diuretic effect.

A. A.

CRAMER (W.), DREW (A. H.) & MOTTRAM (J. C.). **On Blood-Platelets: their Behaviour in "Vitamin A" Deficiency and after "Radiation," and their Relation to Bacterial Infections.**—*Proc. Roy. Soc.* 1922. July 1. Vol. 93. Ser. B. No. B 655. Biol. Sci. pp. 449–467. With 5 text figs. [10 refs.]

"The absence of the fat soluble vitamin from the diet always leads in the rat to a progressive diminution in the number of blood platelets. This thrombopenia is the only constant lesion which we have found, so far, in every case of vitamin A deficiency, and we regard it as the lesion characteristic of this deficiency, just as the lymphopenia is characteristic of the vitamin B deficiency. A thrombopenia may even be found in rats kept on a vitamin A free diet when they do not yet show any obvious signs of ill-health, and are, to all external appearances, normal animals. When a profound thrombopenia has been established, the addition of the missing vitamin A to the diet is followed by a rapid increase in the number of platelets to the normal number, provided that the animal has not been allowed to suffer too long and too severely from the deficiency.

"Exposure to radium produces not only a lymphopenia, but also with sufficiently large doses a thrombopenia. From this the animals recover rapidly, if the application of radium is discontinued, and the dose has not been too large.

"If by exposure to radium, or by witholding the fat soluble vitamin, the number of platelets has been reduced below a certain critical level—about 300,000 for the rat—the resistance of the animal to infection is greatly diminished and infective conditions develop spontaneously. These may lead to a secondary anaemia. The infective conditions may clear up again as the number of platelets is made to increase.

"The blood platelets fulfil an important function in the mechanism of resistance to bacterial infection. Alterations in the local or general resistance to infection are associated with local or general changes in the distribution of the platelets."

A. G. B.

STEPHENS (J. W. W.). **The Incidence of a Disease in Population Groups, the Number of People in which is Known or Unknown.**—*Ann. Trop. Med. & Parasit.* 1922. July 20. Vol. 16. No. 2. pp. 199–205.

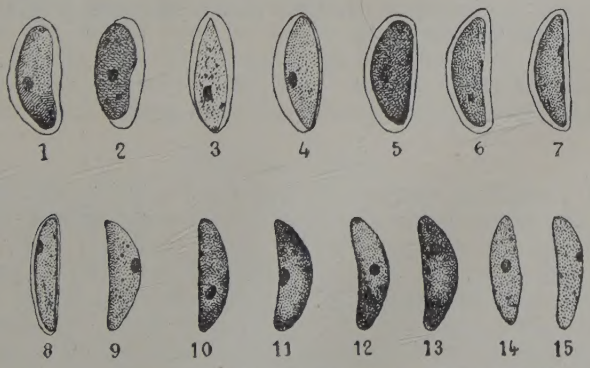
The word "incidence" is often used to express the occurrence or distribution of a phenomenon in a population whose number is unknown: in this use it is not a term of mathematical value. As a coin of definite value in statistical currency a term is required to express incidence or occurrences of a phenomenon in a population whose number is known. For incidence in this restricted sense, the author would employ the term "incidence-rate." The author gives numerous obvious examples of the distinction between "incidence" and "incidence-rate."

A. A.

"HAEMOGREGARINES" IN MAN.

ADDENDUM. By C. M. WENYON.

In a recent number of this *Bulletin* (Vol. 20, p. 527) there appeared a criticism by the reviewer of the claims made by various observers that certain bodies found by them in man were haemogregarines. One of these (*Haemogregarina equatorialis*) had been described by NATTAN-LARRIER* who now gives a more detailed account of the same organism. It was concluded in the critique that this, as well as the other "haemogregarines" of man, was not of this nature, and the further illustrated communication only serves to strengthen the opinion that the supposed haemogregarine of NATTAN-LARRIER is a vegetable organism which had contaminated the films. The parasite, which is described as extraglobular, was found in a single blood film and in a smear made from material obtained from puncture of a gland. The size is given as 5·5 to 7·5 by 1·6 to 2·6 microns. The lentil shape of the majority is again mentioned, as also the presence round some of a capsule. The nucleus is small and not infrequently lies at one side of the parasite. Occasionally two such nuclei occur. In addition to the nucleus the cytoplasm, which, after Giesma staining, varies in colour between a light mauve and deep blue, contains irregular granules of a deep blue or even blackish colour. Apart from the above forms, which occurred both in the blood and gland material, the latter contained numbers of still smaller elongated bodies from 2 to 3 microns in length. These are described in detail. It is remarked that it is difficult to avoid the conclusion that the small forms from the gland represent a stage of the haemogregarine of the blood, though it has to be recognized that the larger forms from the gland differ in certain respects from those of the blood. A comparison of the figures, which appeared in the above-mentioned critique, of known vegetable organisms in contaminated films with those accompanying this paper, will certainly convince any unbiased observer that there is no evidence that *Haemogregarina equatorialis* is a haemogregarine at all, and that it is most probably a vegetable organism, a view which the reviewer is convinced is the correct one.



Haemogregarina equatorialis Nattan-Larrier, 1922 (× 2,250 about).
Reproduced from the *Bulletin de la Société de Pathologie Exotique*, 1923. Vol. 16. No. 6.

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*NATTAN-LARRIER (L.). Sur une hémogrégarine de l'homme. (Deuxième note.)—*Bull. Soc. Path. Exot.* 1923. June 13. Vol. 16. No. 6. pp. 403–408. With 3 figs. [1 ref.]

REVIEWS AND NOTICES.

ROCKEFELLER FOUNDATION. **Review for 1922. A Summary for the First Decade.** By George E. VINCENT (President).—59 pp. With 28 figs. 1923. New York.

We learn from this munificent report that in the pursuit of its aim "to promote the well-being of mankind throughout the world," the Rockefeller Foundation has in its first decade disbursed the enormous sum of 76,757,040 dollars.

The main channels through which the Foundation hopes to influence and stimulate the human race for its material welfare are medical research and medical education (to which nearly one-third of the benefaction just mentioned has been contributed) and the world-wide diffusion of sanitary knowledge—ignorance being the common curse of governments no less than of subordinate humanity—by far-flung demonstrations of the methods and results of public sanitation.

In the year 1922, of which this report gives us some details, the Foundation, in the cause of education, endowed chairs of medicine and surgery in Hong Kong University; financed outright its dedicated child, the Peking Union Medical College; and assisted the educational and other machinery of 19 other hospitals in China; sent eminent medical men on educational missions to the Far East and to South America, and provided fellowships for 237 advanced students of 23 different nations; besides contributing to the maintenance of two medical schools in Canada; systematically surveying medical education and supplying the exigencies of various research institutions in Europe, and definitely pledging its financial countenance to medical colleges and schools in China, Siam and Brazil, as well as to big educational enterprises in London and in Iowa.

During 1922, in the cause of Public Health, the Foundation carried on antimalaria surveys in tropical America, Palestine, the Philippines and Australia, as well as surveys and demonstrations in the United States; continued its operations for the control of yellow fever in Mexico and other countries, and its surveys and re-surveys for the control of hookworm in the Southern States and in 21 areas under foreign jurisdiction; and contributed financially or in personnel to multifarious undertakings of an educative or an administrative character in Europe and in the United States.

The total expenditure on all the items recorded in the report for the year amounted very nearly to 16 million dollars, the costs of administration being only about one per cent.

A. Alcock.